Telephone Engineer

Volume 33 NOVEMBER, 1929 No. 11

Trends in Manufacturing Reports from Washington tell of the project of the Advisory Committee on Manufactures appointed to work with the Bureau of Census in preparation for the 1929 census of manufactures to collect data in such a way as to point out industrial trends. One of the trends that will interest telephone companies is the tendency of certain industries to migrate. In some cases, a large portion of an industry has moved from one part of the country, as in case of the textile industry, a large part of which has moved from the northeastern to the southeastern states. In the case of other industries there has been a tendency to concentration and in others a tendency to spread out over the country.

It is known that such changes are taking place, but to what extent is a matter of conjecture. Independent telephone managers have had very little data concerning such changes, but the Bell system through its statistical department has collected considerable information along this line. If telephone plants are to be engineered with economy, forecasts of future growth of communities must be made. Trends in manufacturing may become very important matters in the making of such forecasts.

It is interesting to note that a special effort is being made to get the information into shape so that the results may be known at the earliest possible date. In case of some of the special census material of the past, the value of the information has been greatly reduced by the fact that there has been too great a delay between the date of collection of the data and the date upon which the report was published.

More and Better Pay Station Locations Our friend Ernest Irwin, Secretary of the California Independent Telephone Association in one of his newsy letters to members of that association called attention to the lack in many towns of convenient pay stations for transient use. He cites cases where no pay stations have been available after the telephone central office closes at nine or ten o'clock. The solution in some places has been to remodel telephone quarters so that a night booth is open to the public throughout the night.

This lack of convenient pay station facilities has been the subject of comment at times but apparently such discussion as it has received has not resulted in action. We have driven through many towns where we were not able to see a single telephone pay station sign on the main highway leading through the place. It would seem that public pay stations would at least be made available along such highways.

There are exceptions to the rules, however. We know of one telephone company in a town under five thousand population which has placed public pay stations in a dozen or fifteen locations which seemed to be favorable. The switchboard has been equipped for collecting and returning coins so that the standard type of pay stations used in large cities might be employed.

It is stated that the installation is an experimental one and that record is being kept of its success. It is to be hoped that the results can be made known for the guidance of others.

Accounting Revision Welcome Accounting officers of telephone companies are much interested in the progress in the revision of the uniform system of accounts for telephone companies as prescribed by the Interstate Commerce Commission. The benefits of the uniform system are no longer in question but the use of the system without modification for longer than fifteen years has shown the need of certain changes. That such a revision will soon be issued is welcome news.

The length of time taken in the revision and the close co-operation between the bureau of accounts of the commission and the accounting divisions of both Bell system and the Independent Group are assurance that the revision will be of a type that will meet the needs of telephone companies for some time to come.

Of interest also is the proposed re-classification

of telephone companies. The classification of companies between $50,000 and $100,000 gross revenues as Class B, undoubtedly means a closer line-up of the accounts prescribed with the system prescribed for Class A companies. No one will mourn the passing of the accounting system now prescribed for Class C companies. In fact, it will be a positive joy to anyone who has had the job of changing the books of a class C company to Class B accounting when the company grows into the larger class. The periodic nuisance of making a Class C report from Class B books as some companies have had to do will also be removed.

Whether the placing of all companies below $50,000 revenue in Class C indicates any change of policy in regard to control and reporting of such companies has not yet been indicated as far as we can learn. It is to be hoped that the Interstate Commerce Commission will continue its present policy of leaving all control of these small companies in the hands of state commissions.

No Place for "Shin Kicking"

In the financial pages of certain newspapers, reference has been made to the suspicion that heads of certain groups of power and gas utilities were figuratively "kicking each other on the shins under the table." The present craze for mergers has inevitably brought certain groups of utilities into conflict over the purchase of properties and it is possible that feelings of not too friendly nature have arisen. There have been possibilities of the same nature in the telephone industry as the tendency toward grouping properties into larger and larger groups has been going on.

Fortunately, thus far none of these differences if any have occurred, have been of sufficient importance to cause any serious difficulties to the industry. For the welfare of the industry it is to be hoped that such difficulties as may develop may be of minor nature that can readily be adjusted. In the electric and gas industries, interconnection of properties has become a recognized program, but failure of the various units to provide interconnection does not appreciably affect the service to the user.

In the telephone industry, the situation is different. Failure to interconnect or even failure to provide proper facilities and service for interconnection already established, has a direct effect upon every telephone user. For that reason owners and operators of telephone systems are under peculiar obligations not only to themselves and their own subscribers but to other companies and the subscribers of other companies.

The interdependence of every unit and every group of units in the telephone industry upon every other unit and every other group make it especially necessary that such differences as do occur be adjusted amicably. Every adjustment of differences must be made on the basis that the more successful every unit in the business becomes, the more successful every other unit and the industry as a whole will be.

There is no place in the telephone industry for kicking of shins. What is needed is the friendly handclasp and the spirit of each doing for the other fellow what he would expect to be done for himself if he were in the other fellow's place.

A Vital Convention

Speaking to a small group gathered on the platform at the end of the great convention hall in the Hotel Stevens overlooking the floor filled with exhibits of every kind with hundreds of visitors scattered through them, President MacKinnon of the United States Independent Telephone Association said that never in the history of the industry had we been able to get such a picture of the vitality of the Independent telephone business.

The convention was indeed a meeting of a living, progressing organization full of energy and vitality. The telephone people who attended were of the energetic, forward looking kind alert to grasp the opportunity to furnish a greater, a better and a more complete service to the public which they had undertaken to serve. The programs were designed to give them a view of opportunities for greater service and greater profits. The casual conversations between friends were about future plans and prospects rather than about past performances.

No one could spend even a few hours at the convention without being convinced that the great Independent telephone industry operating over four and a half millions of telephone stations is not a static but is a dynamic factor in the development of communications of some of its minor units, the Independent group of telephone companies as a whole is doing its share in keeping up to the march of progress in world-wide communication.

Studying Telephone Methods

This Is Chapter 33 of a Series of Articles by E. R. Collins of the Manitoba Telephone System, Brandon, Manitoba, Canada

The One Hundred Line Connector System

In two previous chapters, we studied the equipment required to operate a limited number of telephones. The number of lines we could operate on that system was 22. This naturally meant that this system could not be used for general exchange service. In Chapters 31 and 32, we studied the two pieces of equipment which corresponded to the Subscribers Line Jack and signal, connected to the answering cord of an operators cord set. These were the Line Switch and the Master Switch.

We assumed that the subscriber had removed the receiver from the hook, and that the operator had selected an idle cord, and had inserted the answering plug into the subscriber's line jack. This operation had pulled up the line cutoff relay of the subscriber's line relay equipment, and had put out the line lamp, associated with his line. The operator had not opened her listening key or asked for the number required. We have had the poor subscriber patiently waiting for the past two months to get a little service. Referring to the line switch and the master switch equipment, we find a very similar operation taking place. The subscriber has removed the receiver from the hook. The master switch has previously directed the plunger of this line switch toward an idle trunk. When the receiver is removed, the line relay operates, pulling in the line switch plunger. The plunger operates the line switch bank contact springs, and connects the subscriber's line to the trunk selected. The line relay of the switch connected to this trunk operates from the subscriber's telephone which is connected to the trunk circuit. The line relay operates, pulling up the armature of the "B" relay which grounds the release trunk back to the line switch bank. This grounded release trunk grounds the coil of the B. C. O. relay, and holds its armature pulled in. The armature had been previously pulled in when the subscriber's line relay operated the pull down coil to pull in the line switch plunger. The subscriber's line relay was slow release, and remained energized until the ground circuit of the release trunk had been completed by the connector relays. The subscriber now is ready to operate the dial to call his number.

In Fig. 260 we have shown in review the line switch with the line relay and the B. C. O. coil. The slow acting slug of the line relay has been omitted in error. The pull down winding of the B. C. O. coil has been left out for simplicity. The line relay coil of the connector is shown, but the "B" relay is only indicated by the ground on the release trunk.

Found Interesting

ARVID DAHM, Engineer,
Standard Electric A/S,
Oslo.

Oslo, August 2, 1929.

TELEPHONE ENGINEER,
Chicago, Ill.

In the TELEPHONE ENGINEER are published a series of articles by Mr. E. R. Collins—"Studying Telephone Methods." I have found these of great interest, and you would greatly oblige me if you would advise me if these articles have appeared in book form. I would then immediately order this book.

Your kind reply would be greatly appreciated.

Yours very truly,
ARVID DAHM.

There are three extra wires shown which we did not show in the previous chapter. They are called sometimes the *Private Normal, The Negative Normal,* and *the Positive Normal.* They are connected to three terminals on a group of contacts called the connector bank. The private contacts are grouped in one block and the line contacts in a similar block. These three wires are connected to the subscriber's line at (1) and (2) on Fig. 260. The subscriber's line therefore is connected to the connector bank terminals, and also is bridged to the line relay coil and ground through the B. C. O. springs. If therefore a ground is placed on the private contact of the connector bank, the B. C. O. coil of that line will operate and cut the line relay and ground away from the subscriber's line. This operation is similar to that of a common battery multiple board, where a line is called. When the operator inserts her plug in the multiple jack, the cut off relay cleared the called line of all line signal apparatus.

When therefore an automatic subscriber desired to make a call, he is connected to the calling equipment by way of the line switch bank contacts.

When his telephone is called, the connection is made to his line by way of the connector bank contacts. This operation clears his line of all calling apparatus.

The route of a call from Line No. 33 to Line No. 42 is illustrated in Fig. 261. The heavy black line indicates the path of the call, and the light lines indicate circuits connected but not in use.

No. 33 removes the receiver from the hook. The line switch operates and connects to trunk No. 5 as shown in the drawing. There would naturally be 10 or less trunks connected to the line switch bank. The master switch in this case has directed the call to No. 5 trunk. Connected to the No. 5 trunk is a switch called a connector. This switch is called a two motion switch. That is when the subscriber dials Fig. 4 for instance, the switch will move its wipers 4 steps in a certain direction which in the case of the equipment we are studying, will be *upward.* The first figure dialed will therefore cause an *upward* or *vertical* motion to the connector wipers.

We will refer to this as the vertical motion in all our descriptions which follow.

The second figure (2) of the number called which is 42, will cause the wipers to move in a horizontal and rotary motion. This we refer to as the *rotary* motion of the connector. To call No. 42 therefore requires 4 vertical impulses, and 2 rotary impulses. When the wiper of the connector has come in contact with the No. 42 contacts of the connector bank of terminals, connection will be made by way of the No. 42 normal lines, to the line switch as shown in Fig. 260 (1 and 2), and thence to the telephone called. The No. 42 line switch is cut away from the line by its B. C. O. springs, therefore the plunger of No. 42 line switch will not operate. We have shown this condition by the light arrow at No. 42 line switch, indicating that there is no connection to the line switch trunks. It will be noted also that we have shown No. 5 connector as connected to both No. 33 and No. 42 line switch banks as would be actually the case.

Again in Fig. 262 we have shown the reverse condition where No. 42 is calling No. 33. Here there would be the plunging of No. 42 line switch, selecting No. 5 connector as before. The connector is driven by the impulses of No. 42 telephone, to make 3 vertical steps, and 3 rotary steps, selecting No. 33 contact of the connector bank. This pulls up the B. C. O. coil of No. 33 line switch, and connects the connector to No. 33 telephone as in the previous case it con-

nected to No. 42. In this case also the line switch of No. 33 is shown as not plunged, but its line switch is facing No. 5 connector trunk.

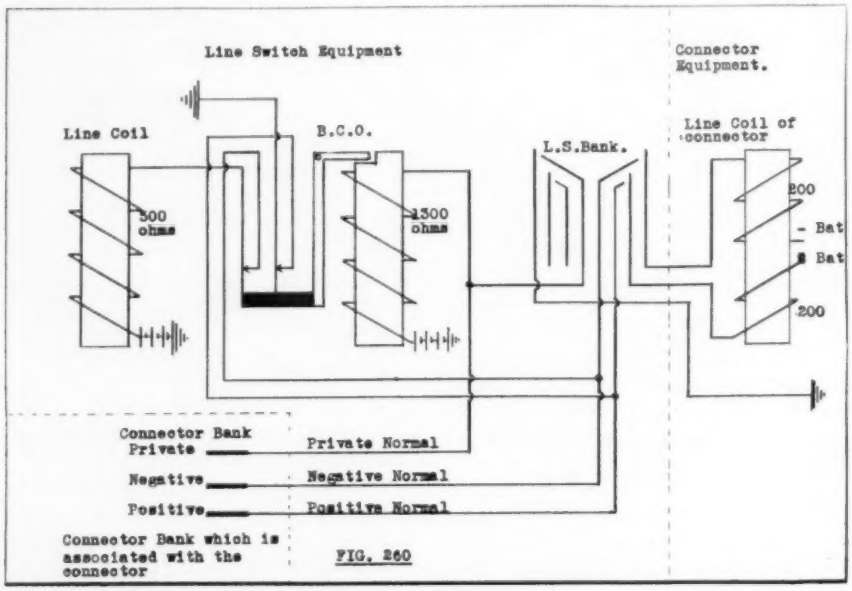


FIG. 260

Connector Bank Arrangement

In our study of the dial or calling device we learned that if the dial is turned with the finger in No. 1 opening, that the dial on returning would open its line once. This sent one impulse over the line. Figure 2 would give two impulses, Figure 4, four impulses, and Figure 0 would give 10 impulses.

In Figure No. 263 we have shown the arrangement of a typical connector bank of 100 lines. The normal position of the connector wiper springs is shown to be one step to the left, and one step below No. 11 contact. Therefore if the connector mechanism raises the wiper one step up and then turns it one step in, it should come to rest with the No. 11 contacts between the tips of the wiper springs. Then 2 steps up and 3 steps in would bring the wiper to No. 23 contacts. Again 5 up and 7 in would bring the wiper to No. 57 contacts. In connecting therefore with No. 33 there would be 3 vertical and 3 rotary steps. This is usually referred to as 3 up and 3 in.

Then if No. 10 is called we will have *one vertical and* 10 *rotary* impulses. This brings the wipers 1 up and 10 in then to connect with line No. 10. This means that any number ending with 0 must be at the extreme right of the bank.

The contacts are arranged in 10 rows vertical, and 10 rows horizontal. The horizontal rows are called levers. Therefore line No. 55 would be in the 5th level. The first 10 telephones of the 100 are found in the 10th level. In the 100 line system, the connector requires to make first the vertical motion, to select the level of 10 lines. Then the rotary motion is required to select the contact of that level. It is quite obvious therefore that two digits are required to bring the wipers into contact with any contact of the bank. Therefore to call telephone No. 1 we add the digit 0 which gives 10 vertical impulses and lifts the wiper to the 10th level, the second digit 1 then connects with line No. 1 or line 01.

Telephone 100 again has only two motions, the vertical and the rotary, therefore the first digit "1" is ignored, and the last two digits only are used. This gives 10 vertical and 10 rotary impulses bringing the wiper to the extreme right of the 10th level of the connector bank.

It would have been quite possible to have reversed the arrangement and have the wiper make the rotary motion first, and the vertical motion second. In this case the wiper contacts would have been set on edge instead of flat as in Fig. 263.

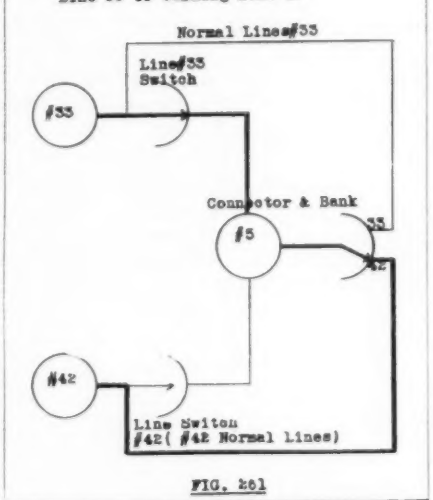


FIG. 261

This would have the advantage of greater freedom from dust collecting on the contacts or the wiper tips. However, it would have a disadvantage. The vertical motion is supplied by a magnet which is required to lift the weight of the shaft and the wiper assemblies and cords. But in Fig. 263 the wipers are rising free of the bank contacts, so that only the weight of the shaft is the load on the magnets. If the rotary motion were first, then the vertical magnet would have to lift the shaft while the wipers were sliding over the contacts. This would impose a great load on the vertical magnet, while the rotary magnet would have a very light load. The arrangement in Fig. 263 therefore gives a better distribution of the load between the vertical and the rotary magnets. The matter of dust collecting can be prevented by proper routines which will be described later.

The Connector

The general appearance of a connector switch is shown in Fig. 264. The connector and selector are quite similar in appearance. The main difference is in the circuit arrangement and the relay assembly. The relays in Fig. 264 are shown lettered. Relay "A" and "B" have been mentioned in previous chapters. The general function and the circuit arrangement of the connector switch will be taken up in a following chapter. We are chiefly concerned with the mechanical features of the switch. The relays are the connecting link between the subscriber's dial and telephone, with the operation of the mechanical apparatus of the switch.

There is first of all a shaft on which is mounted a hub. This hub has at the upper section, 10 ratchet steps milled. These steps form circles around the hub. The lower section of the hub has 11 vertical ratchet steps milled. These cannot be seen in this photo, but the ratchets are facing the switch.

At the rear of the vertical hub is a vertical armature, which is operated by a pair of vertical magnets. This armature operates when the subscriber's dial is turned to the first digit. To the right of the shaft hub is shown a piece of metal called a double dog. This double dog has one tooth that can drop in under any vertical tooth of the hub, and another tooth that can drop in behind any of the teeth of the rotary hub. The double dog is pressed to the left by a spring mounted on the frame of the switch. The double dog, however, is prevented from moving to the left by this spring. There is a hook on the back end of the double dog which holds it away from the shaft hub. This hook is released as soon as the vertical magnet moves upward the distance of one tooth.

When one or more vertical impulses are sent the vertical magnet will lift the hub and shaft one step at a time. The double dog drops in after the first impulse, and holds the hub from dropping while the vertical magnet releases and

makes the second upward movement. Thus step by step the shaft moves upward, the double dog holding between each impulse, until the shaft is driven up to the desired level. There is a slot milled upward through all the vertical teeth of the hub. This is on the left

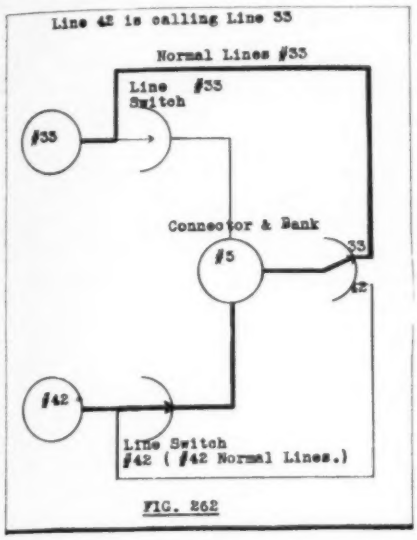


FIG. 262

side of the hub facing the stationary dog. The nose of the stationary dog extends into this slot but when the shaft has risen to any level, the nose of the stationary dog is so shaped and adjusted that it will be clear of the teeth of the vertical hub to allow the shaft to rotate. This will be described in more detail in the following chapter.

As soon as the shaft has risen one impulse, there is a switch called the off normal switch, as shown in Fig. 264, which switches its contacts and prepares the switch for the rotary motion as soon as the vertical impulses have stopped. When this circuit is complete the impulses of the second digit operate a pair of rotary magnets, and cause the rotary armature and pawl to rotate the shaft, turning the wipers in to the right. As soon as the shaft commences to rotate, the stationary dog rides under the vertical tooth of the vertical hub, corresponding to the level reached. This prevents the shaft from dropping while it is

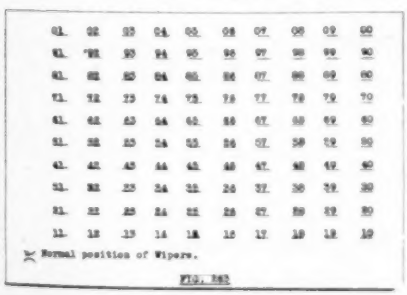


FIG. 263

being rotated. The vertical tooth of the double dog also is under the vertical tooth of the hub, but will move in and out as the lower double dog tooth rises and falls over the rotary hub teeth as it rotates. The double dog lower tooth holds the steps gained by the operation of the rotary magnets. As soon as the desired contact is reached, the double dog holds the shaft from turning back.

At the upper end of the shaft is located a cup with a helical spring inside. When the shaft is turned to the right the tension of this spring is increased. Therefore when the shaft is up and in there will be a backward pressure on the lower tooth of the double dog, which rests behind a tooth of the rotary hub. The downward motion of the shaft is prevented by the stationary dog.

Releasing the Switch

The operation of the off normal switch has also prepared a circuit with the relays, so that when the subscriber hangs up his receiver the line relay releasing will close a circuit through a release coil. This coil will pull in its armature which is shown on Fig. 264. This armature has a wide movement, and is supplied with a hammer in the form of an adjusting screw. When the release amature operates the hammer hits the rear end of the pivoted double dog. The back end is driven in to the left until the hook operated by the vertical magnet drops over a projection of the double dog. This locks the back of the double dog to the left. When the part of the double dog at the back of its pivot is driven to the left, the front end with its two teeth, is forced to the right. This removes the double dog teeth from both the vertical and rotary hub. But the stationary dog is under the vertical hub tooth, so

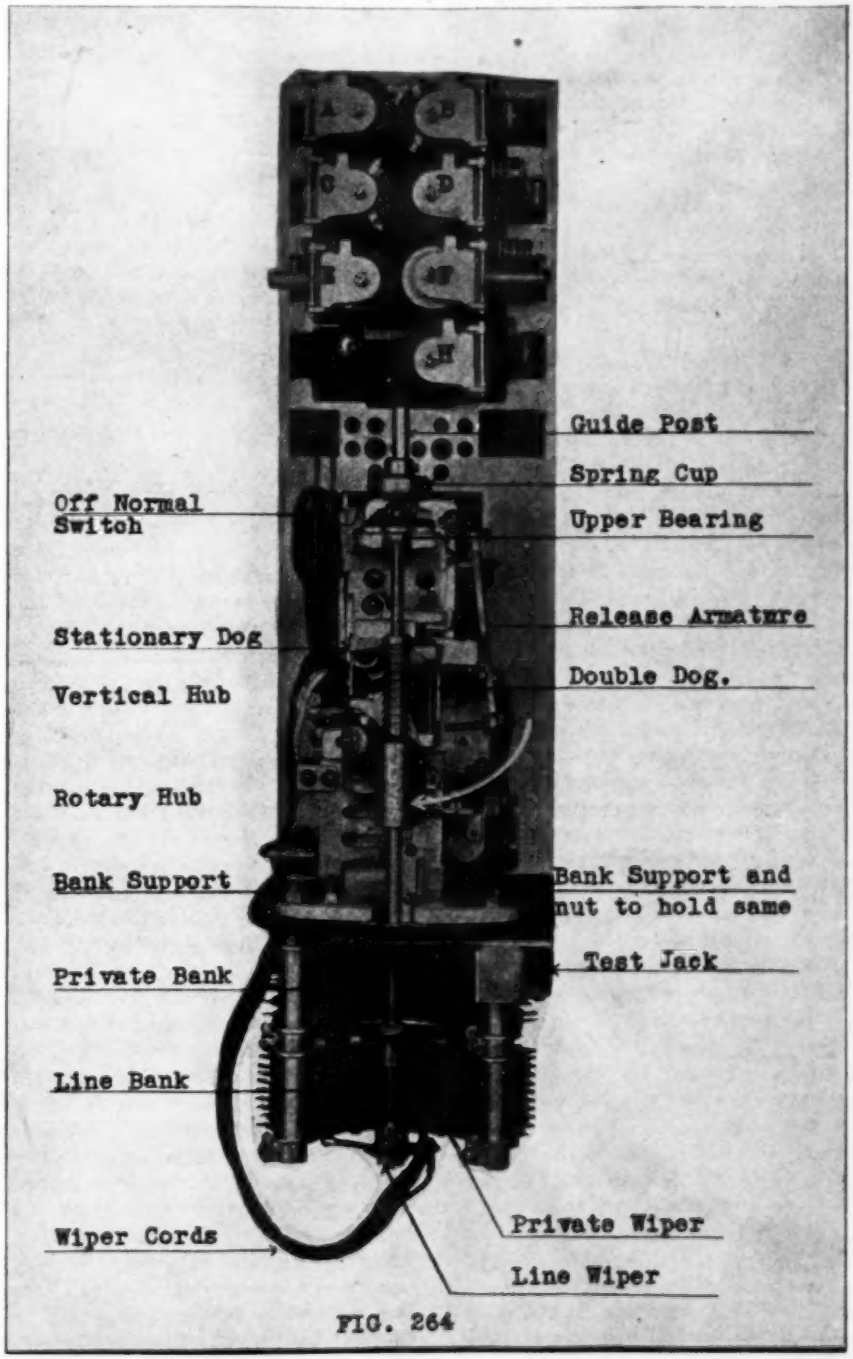


FIG. 264

the shaft will not drop. But the rotary hub is now free to move, and the shaft spring turns the shaft back to the left, until the stationary dog projection comes in line with the slot up through the vertical hub teeth. This allows the vertical hub to drop free of the stationary dog and so the shaft drops by force of gravity. The wipers are at the same time turned the left out of the bank, and the shaft drops to normal bringing the wipers back to the position shown in Fig. 263, and also in Fig. 264.

There is other apparatus shown in the lower part of the switch in Fig. 264 which will not be discussed here. This is called the side switch and private magnet.

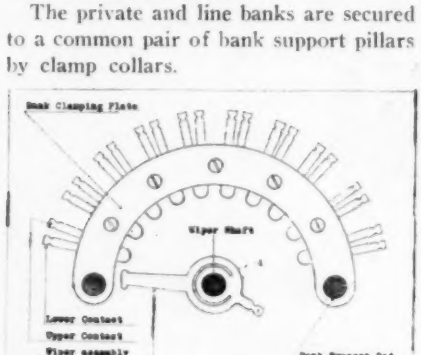
Bank Assembly

The connector bank is independent of the switch. The switch is bolted to the bank by means of two support pillars which project through the switch frame and secured by two nuts. To remove the switch from the bank, the nuts are taken off and the bank can then be lowered from the switch.

The bank is in two sections. The upper is composed of 100 contacts set in a semi-circle, clamped between insulation and metal clamping pieces. The whole assembly of contacts is securely bolted together by 5 machine screws. The upper bank is called the private or guarding bank. Its purpose is similar to that of the sleeve contacts of the multiple jacks of a common battery board.

The lower bank is composed of 200 contacts set in similar arrangement to the private contacts. The lower or line banks are arranged so that the contacts come in pairs one above the other. A strip of insulation extends between these pairs of contacts. These line contacts correspond to the tip and ring springs of the common battery multiple jack and are the talking contacts.

The private and line banks are secured to a common pair of bank support pillars by clamp collars.



In Fig. 265 is shown the detail of the arrangement of the bank contacts. They are arranged in groups of 10 contacts to a level. The soldering terminals are brought out at the back of the bank and are staggered to provide better clearance in wiring. The upper and lower contacts of a pair are immediately above one another, but the soldering tab of the upper contact is shown set out to be out of line with the lower contact.

The position of the bank support rods and the clamping screws are also shown. Where a pair of contacts comes in line with a clamping screw, the contact is punched of such a shape that it will not come in contact with the screw.

The Wiper

The contacts and wiper are made of non-corroding material, with long wearing qualities. The line and private wipers are similar in construction, but adjusted somewhat differently. The upper wiper spring of the pair is shown as No. 1 while the lower No. 2 is shown with its soldering lug out of line with the upper. This gives clearance for attaching the wiper cords.

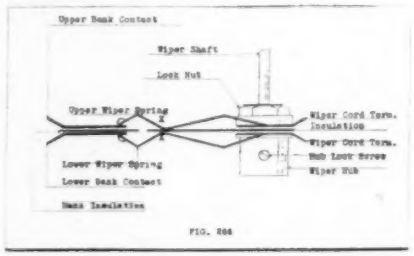


FIG. 266

In Fig. 266 is shown a typical wiper assembly. This is composed of two phosphor bronze springs mounted on a hub. The springs are carefully insulated from each other and from the hub. The tips of the wiper springs are slightly wider than the main body of the spring, and the outer ends of the tips are rounded up so as to provide a smooth surface to pass over the contacts. The line wiper must pass over the thickness of two contacts and a strip of insulation between as shown in Fig. 266. When the line wiper is free of the bank, the tips of its wipers must not touch, but the pressure of one spring against another must come where the wipers come close together with the insulation between as shown at "X" Fig. 266. The spring tension of the wipers must be such that if the upper wiper is moved upward, the lower wiper will follow it upward the distance of one-eighth inch. And if the lower wiper is pressed down, the upper wiper will follow down the distance of one-eighth inch. This is called the follow up tension.

The tension of the wipers is exerted from a point on the hub about in line with the shaft.

The private wiper passes over a single contact with no other thickness. Therefore the private wiper springs can be adjusted so that the tips come in contact when the wiper is free of the bank contacts. The two private wiper springs are connected together at the wiper terminals, so that electrically they are as one spring, as is the case with the private banks with which they contact.

The wiper springs must be so adjusted that they will be in true alignment. That is the insulation between the line contacts would be in a line with the insulation between the wiper springs, as shown in Fig. 266. This adjustment is secured by the set screw in the wiper assembly hub, which holds the hub on the switch shaft. In the following chapter we will discuss in more detail the mechanical operation of the shaft mechanism.

The Fruits of Frankness

The following clipping from the Messenger, of Athens, Ohio, demonstrates the fairness of the public when frankness is shown in business matters. Incidentally Dr. C. L. Jones, who directs the destinies of the Athens Home Telephone company, is paid a high compliment by the editor of the Messenger. The editorial follows:

FRANKNESS ALWAYS PAYS

Frankness in dealing with the public is as successful with a public utility as it is with an individual. Athens has seen demonstrations of this in several of its concerns which deal with a large number of the people, as have other towns in this section of the state.

An outstanding example of frankness in dealing with the public is the Athens Home Telephone Company. There have been rate increases granted the telephone company, but everyone of them followed a campaign of information to the public. The increases were shown to be necessary to furnish the service that the patrons of the company reasonably expected. The company freely took the public into its confidence in public meetings, advertisements and in every contact with its patrons and city officials. Every move was laid before the public weeks or months in advance and everybody had time to think it over. It is true that everybody did not see it in a favorable light, but the majority of the people did.

Perhaps this is why Athens has a telephone service that is comparable only to those of the largest cities, and in fact is better than that of most cities. And that is the reason that Dr. C. L. Jones is a national figure in the telephone business, a small city telephone company manager. His words are repeated all over this country where telephone men gather, and he has received national and state recognition a number of times. It is doubtless because he has that rare insight into public relations that is given to few utilities' executives.

Telephone Pioneers Elect New Yorker for New President

J. S. McCulloh, New York City, was elected president of the Telephone Pioneers of America in session at the Nicollet hotel, Minneapolis, Friday and Saturday, Oct. 17th and 18th. Mr. McCulloh will assume office January 1, 1930.

The National Convention

An outstanding convention of the Independent Telephone Industry came to its close in Chicago on October 26th, after a four days' session. Designated by the officers of the United States Independent Telephone Association as a "Convention for Profit," a large portion of the program was devoted to the problems incidental to getting the telephone industry as a whole upon a satisfactory basis of earnings so that a fair return on the capital invested might be realized by owners of telephone securities. Held for the first time in the new Hotel Stevens, the convention offered exhibits of the products of manufacturers and supply dealers far more extensive and attractive than ever before. The great exhibition hall of the hotel was filled with the exhibits which attracted large crowds throughout the convention. Division meetings drew the usual large groups interested in the special problems of plant, traffic, commercial and program service departments.

The sessions opened Tuesday afternoon with the report of C. C. Deering, secretary-treasurer of the association. Mr. Deering's report indicated good financial condition of the association and revealed a small increase in membership of telephone companies. Following Mr. Deering, a report of the activities of the Washington office and a survey of federal legislation affecting communication companies was given by A. L. Geiger, Washington representative of the association. Mr. Geiger spoke of the Couzens bill to create a communications commission to take over the work of the Federal Radio Commission and the control now exercised by the Interstate Commerce Commission over wire companies. Hearings will be resumed when Congress reconvenes but it is doubtful if anything can be accomplished before the expiration of the life of the present radio commission which occurs on January 1, 1930. It is probable that some legislation to make effective radio control after January 1 will be enacted, and hearing on the general communications commission will be continued. Attention was also drawn to the Ludlow measure to declare counterfeit all substitutes for money in coin operated machines. As the measure now stands, the use of slugs in coin collecting machines is recognized practice in some cities. He also spoke about the status of the depreciation order of the Interstate Commerce Commission and matters relating to income tax procedure.

The reports of the accounting, plant and traffic divisions were then heard. W. L. Lemon, chairman of the accounting division, reported on the meetings of the general accounting committee with representatives of the Interstate Commerce Commission relative to the depreciation matter, the revision of the uniform system of accounts, and reclassification of telephone companies. A short resume of recommended changes in accounts was given. A. L. Stadermann, chairman of the plant division, stated that the association is now represented in ten projects under the procedure of the American Standards Association, which is the reorganization of the American Engineering Standards Committee. A number of projects have reached completion during the past year, including standardization of dry cells, hard drawn copper wire, and a code on protection from lightning.

Miss Anne Barnes, secretary of the Traffic Committee, gave the report of that division. She spoke of the results of the correspondence courses for long distance and local operators and the distribution of instruction books prepared by the division. The traffic division was represented on the program of six state conventions.

President MacKinnon's Report

President F. B. MacKinnon in making his usual annual statement to the convention referred to the operating statistics which the association gathers concerning member companies. Of the association membership 243 companies are reporting to the Interstate Commerce Commission having in round numbers 2,250,000 telephone stations or approximately one-half of the total number of independently owned stations. Comparing Class A, B and C companies, the ratios of operating revenues to fixed capital of 24.1, 23.4 and 26.3 per cent, respectively. On the other side of the picture, however, it was found that the ratio of earnings available for interest and dividends to fixed capital were 6.5 per cent for Class A, 5.6 per cent for Class B, and 4.6 per cent for Class C. Obviously the Class C companies are not getting enough to attract capital to make needed improvement to their properties. The problem is the same as we have had for 30 years—that of getting sufficient revenue to pay a return on the investment.

The problem is one of getting sufficient revenues, and in order to find a solution, service must be put on a plane that public service commissions will allow an adequate rate. It must be repeated that there are no speculative profits in the telephone business. It is close application to business that brings the necessary returns. The problem a few years ago was to secure men and money for development. There is now plenty of money but the need of men is as great as ever.

In speaking of the relations with the Bell system, Mr. MacKinnon emphasized the fact that the Independent association was still strongly adhering to its policy that two groups of the industry must be maintained. It has strongly opposed the absorption of Independent properties by the Bell and has taken the position that the acquisition of minority interests in Independent companies is objectionable. One of the questions of the hour is the handling of the toll business. The Bell company has been going ahead rapidly and it has been a real problem for Independent companies to keep up their end. The object of the association is to maintain a prosperous group of Independent companies, and to gain the end those companies must have a fair share of the revenues that come from the public.

During the session President MacKinnon followed the custom established at previous conventions and introduced visitors from many states and Canada. At the close of the meeting a nominating committee consisting of P. C. Holdoegel, W. N. McAnge, Jr., and Harry Todd was appointed.

The Commercial Session

In keeping with the designation of the convention as a convention for profit, the Wednesday morning session was devoted to a report of the commercial division and to papers dealing with commercial topics. R. F. Wilder, chairman of the commercial division, first gave his report, outlining the features of the work of the commercial division and suggesting a future program. He was followed by J. H. Agee of the Lincoln Telephone & Telegraph Co., who gave a very interesting discussion on the subject of increasing net profits. Basically, he said, our revenues come from exchange service in the main, and secondly, from toll service. Regular campaigns for increase of revenues from these services are necessary, but advantage should be taken of the opportunity to increase earnings through sale of supplemental services. He then discussed in detail the possibilities of increased earnings from six types of supplemental services. Directory advertising offers a profitable source and is susceptible of further development. Public address systems have been found to be a source of revenue by the larger companies. Leasing of spare facilities to program service companies also offers an opportunity for earnings not otherwise possible. Remote control radio programs also furnish revenue where circuits are needed and are available. Two new developments are secretarial service and stenographic service

which can be offered to business men who do not require the service of an office assistant.

To insure satisfactory net earnings not only income must be increased but outgo must be watched. Contributions to various purposes can easily get out of hand and newspaper advertising may be overdone. House organs may become very costly and transportation and service charges may be more than justified. As a closing thought Mr. Agee said that no service can be sold to a customer continuously at a profit unless the service is kept up in value to the price charged.

Following Mr. Agee was a paper by Frank T. Byrne of the Rochester Telephone Corp. on "Campaigns for New Subscribers." Mr. Byrne used as his text the parable of the ten talents as illustrating the difference between a company which is growing and one that is standing still. The idea that the telephone has a monopoly is obsolete, for it is subjected to the severest form of competition with every form of modern convenience for the public dollar, and only by active sales effort can the telephone company get its share of business. He then spoke of the Rochester problem and the methods employed in the sales campaign. Newspaper advertising was shown on the screen and a demonstration of a sample radio program was offered.

The session closed with a business meeting at which the report of the nominating committee was heard and directors elected. The following directors were re-elected: J. P. Boylan, Rochester, N. Y.; J. B. Earle, Waco, Tex.; W. F. Goodrich, LaCrosse, Wis.; H. L. Harris, Chicago, Ill.; C. L. Jones, Athens, O.; Frank A. Knapp, Bellevue, O.; Geo. W. Robinson, St. Paul, Minn.; E. D. Schade, Johnstown, Pa. New directors are George X. Cannon, Freeport, Ill.; R. B. Still, Tyler, Tex., and A. Wardman, Whittier, Cal.

Division Conferences

The various divisions of the association met for conferences covering their special lines of work on Wednesday afternoon. As these conferences were somewhat of less formal character than the regular programs, they brought out much in the way of discussion of the problems presented. This feature has come to be one of the interesting features of the convention that is looked forward to by many visitors.

The accounting division program was concerned principally with accounting matters now before the Interstate Commerce Commission. A detailed statement of proposed changes in the accounting system was presented by Mr. E. C. Towner, auditor of disbursements of the Tri-state Telephone & Telegraph Co. Following Mr. Towner, Mr. F. A. Barnes of the Bureau of Accounts of the Interstate Commerce Commission was introduced and commented upon the proposed changes, some of which are still tentative in nature. It is expected that the order of the commission in respect to depreciation and to accounting practice will become effective on January 31, 1931, according to Chairman W. L. Lemon of the Accounting Section.

The Traffic Division presented three papers as its program during the conference session. A. C. Stuart, traffic and equipment engineer of the Utilities Service Co., Lima, O., followed the development of toll traffic methods from early days to the present. He was followed by Miss Ada Hootman, chief operator of the Cambridge (O.) Home Telephone Co., who had as her topic, "How Much Depends Upon the Individual Employe?" The final paper by E. L. Gaines of Fort Wayne, Ind., dealt with some of the special services which telephone companies are called upon to render. All of the papers provoked interesting and instructive discussions.

The plant division presented a discussion of the report of the Committee on Protection Against Lightning, by Wallace L. Cook of the Reliable Electric Co. and John S. Baker of the Cook Electric Co. Three parts of the report, those on protection of persons, of buildings and structures, and of buildings containing inflammable materials, are completed as tentative standards. Parts 4 and 5 on protection of electrical apparatus and lines are in process of completion. Following this report was a paper by Rolf Selquist of the Copperweld Steel Co. on "Electrical Data on Driven Grounds." Mr. Selquist's paper will appear in full in TELEPHONE ENGINEER.

The last paper on the program, "Teletypewriters," was presented by A. B. Benjamin of the Teletype Corp., Chicago. Mr. Benjamin outlined the place of the teletype instrument for transmitting written messages by means of a typewriter keyboard. There are many services in which it possesses peculiar advantages over the other methods of communication. It offers a promising source of supplementary revenue to telephone companies as the line circuits used are similar to those used for Morse telegraph lines. Likewise telephone companies have the skilled personnel for maintenance, as an intelligent telephone man can be trained in a few weeks to become a skilled maintenance man on the teletype machines. As in the other conferences there were free discussions of the various subjects and many valuable suggestions were made from the floor of the conference.

The commercial division conference was without definite program, the time being given to reports of district chairmen and discussion of topics presented at the general meeting of Wednesday morning. Much of the discussion centered about campaigns for sale of telephone services and about special services rendered by telephone companies. One of the services especially receiving comment was the secretarial services described by Mr. J. H. Agee.

Program Service Conference

The session of the program service division on Friday morning presented a full program to a room full of interested people. The American Program Service Association wound up its affairs by voting to become a division of the United States Independent Telephone Association under conditions prescribed by the board of directors of the telephone association. Mr. L. O. Painter of the Tri-State Telephone & Telegraph Co. was appointed chairman of the division and took charge of the meeting.

The first speaker was John A. Gustafson, the real pioneer of program service, who spoke of program service in small towns and rural communities. He was followed by A. L. Geiger, general attorney of the U. S. Independent Telephone Association, who gave an extended discussion of legal phases of program service. He spoke of the various bills relating to communication service now pending before Congress and gave particular attention to the copyright and patent laws as affecting program service companies. Ray H. Manson, chief engineer of the Stromberg Carlson Telephone Mfg. Co., outlined recent improvements in radio and program service apparatus and stated that the manufacturers of this type of equipment were in position to supply apparatus capable of giving first class service. To make program service a success it is necessary to provide programs of good quality and of general public interest. O. C. Levy of the Automatic Electric Co. presented a paper describing apparatus to provide selection of more than one program. As this paper goes into some detail in the technical aspects of the system is reported more fully on another page of this edition.

R. S. Brewster of Lincoln, Neb., outlined methods of maintaining a satisfactory sale of service during the usual summer slump in radio, and George R. Eaton, chief engineer of the Kellogg Switchboard & Supply Co., gave some of the recent developments in the carrier current type of program service system. He spoke of the system proposed for use on a power system in Cleveland, O., where a tuning unit was to be used with the ordinary radio set. In another system the method of operation was to provide three channels of carrier current each carrying program. A telephone cable was saturated with this carrier current and the various programs were picked up by a suitable receiving set.

No report of the convention would be

(*Continued on page* 38)

Aerial Cable Construction Methods

Some New Ideas and Suggestions on Selection of Gang and Tools When Stringing Messenger, Pulling In Cables, etc.

By RAY BLAIN

Just a few short years ago we considered it necessary to have a gang of ten or twelve well trained men before even the smallest aerial cable job could be attempted. With the passing years has come a change in material, construction methods, tools and even men until at the present time when it is necessary to have a gang of only four or five workmen properly equipped to handle even large cable jobs with greater speed than was possible with the larger gang in the old days with older methods.

Selection of Gang and Tools

One first class lineman should always be in every cable gang to make deadends of messenger and handle the other important work. A second lineman who need not be so skilled can be used as a helper to the first, and a third while not absolutely necessary can be used to advantage. One groundman, a working truck driver and the foreman will complete the crew. With this small gang a power truck and proper tools will of course be required to handle the work to advantage. The following tools, in addition to the belt tools of the linemen, will be necessary:

Cable reel cart	1
Block and tackle, 3 sheave 8 in.	1 pr
Block and tackle, 2 sheave 6 in.	2 pr
Block and tackle, 2 sheave 3 in.	1 pr
Cable rollers	4 ea
Cable grips, woven wire type	2 ea
Manila rope ⅝ in.	1 length
Digging bar	1 ea
Snatch block 8 in.	1 ea

A good reel cart is most essential and I prefer the type that lifts the reel from the ground as they are more convenient than the one that must be jacked up and the axle slipped through it and the wheels slipped on the ends. Rubber tires in this age of concrete pavements are also a decided advantage and almost a necessity. The number of woven wire grips and their size will be determined by the sizes of cable being strung. The length of rope required will depend on whether the rope or No. 9 iron wire is to be used to pull the cable into place. It may be necessary also to have a few short pieces of rope to carry messenger over power wire or busy streets when it is being strung out.

Stringing Messenger

After anchors and guys are all properly placed the next job will be to string out the messenger. The messenger reel should be mounted on the reel cart and placed at one end of the cable run, preferably the end from which it will be pulled. I have always found it advisable to bore holes and mount suspension clamps only on poles that are either high or low in the grade of the line. Then drive nails or lag screws at the approximate location of the messenger on all intermediate poles. The reason for this is that if the poles are all measured from either the tops or the ground level and all suspension clamps located, later when the messenger is pulled it may not be on the proper grade. This will make necessary to bore new holes to raise or lower it on numerous poles, a practice that is anything but desirable.

I always prefer the 3-bolt suspension clamp on all cable work although the single clamp is very satisfactory in most cases. The through bolt should be a ⅝ in. galvanized machine with a 4 to 6 inch raised thread. Bolts should be long enough that a full thread is possible on the outside nut.

Place a 2¼ inch square galvanized washer on each side of the pole and tighten first nut good and tight. Put on suspension clamp and leave bolts in it loose. Now run second nut on through bolt and place messenger in clamp. Tighten outside nut so that messenger will be held in clamp but not tight enough to grip it when being pulled through.

The messenger is generally placed on the street side on streets and the alley side of poles in alleys but this practice is not a necessity and it can be placed where it presents the best appearance.

One man should be left to watch the reel and the truck used to pull out messenger. If the truck can not be driven along the line it will be necessary to pull with a span or more of rope making new hitches from the truck when necessary. In the crossing of trolleys or other power circuits first pull up a manila rope that has the pulley in line attached to it with cable rings or loops of rope so that the messenger can be kept well in the clear at all times. This same arrangement may also be necessary over busy streets and care should be taken that at no time does rope sag low enough to catch the tops of passing automobiles, trucks, or other vehicles.

After the complete stretch is pulled out the end farthest from the reel should be deadended and nails driven in the pole to hold it in place until it comes under the strain of the pull. The length of the pull and the size of the cable to be used will determine the number of 3-bolt guy clamps to use. Personally I prefer to use not less than two on all cables although one clamp with two loops of the messenger around the pole will hold a tremendous strain. The advantage of using not less than two is that one may develop a defect and two will insure against a possible slip.

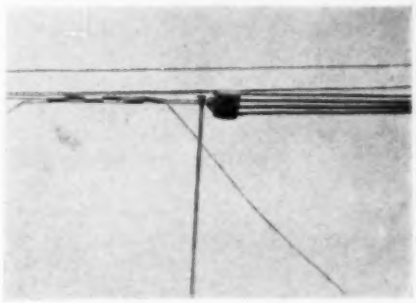


Fig. 1—Clamps for Attaching Blocks to Messenger

Now the slack should be pulled up at the reel either by hand or with the truck after the messenger has been laid on nails or bolts on all poles of the pull. It is necessary to have a clamp to attach the blocks to messenger that will not injure it in any way. The ordinary haven clamp is suitable for pulling guys but is not satisfactory for a strain as great as on a main messenger pull for it will flatten and nick it. Special clamps are on the market at a small cost or an arrangement can be used by taking a loop of messenger and a number of 3-bolt clamps and attaching them as indicated in Fig. 1. One end of the 3-sheave blocks should be attached to the clamp and the other to the deadend pole. To provide proper clearance for deadening, these blocks should be attached to the pole with a sling just below the strain plates. A lag screw should be driven into the pole to prevent sling from slipping down before strain is placed on the blocks. A digging bar should be tied in the block hook where it is attached to the messenger clamp to prevent the blocks from twisting. All block hooks should be tied shut with a piece of No. 14 iron wire to prevent a slip that might cause a serious accident. A good rope sling can be used to attach blocks to pole but a better one can be made from a short piece of

messenger with a thimble served into each end.

The fall line from the main blocks can be extended either way but it is generally best to take it away from the deadened pole as then the second pair of blocks can be hooked from it to the next pole of the line at the ground level. Two pair of blocks will be sufficient for short pulls with no corners and on long pulls the third set can be hooked from the fall line of the second set to the ground level of the deadened pole. Such an arrangement is indicated in Fig. 2.

With the triple block arrangement a tremendous pull can be exerted and care must be taken not to break strain insulators or some part of the rigging. This is especially true if a truck is used to pull the blocks. It is difficult to give a set and fast rule to determine how tight a messenger shall be pulled. Use your own good judgment and remember that there is always more danger in getting it too tight than there is in leaving it too slack. If you do this I will venture that you do not make a mistake. Messenger can be pulled tighter on a lead with short spans without danger of expansion and contraction causing damage to the cable than it can on one with long spans. A 50-pair cable of 22 ga. in place should have a slack of about 11 inches in a 100-foot span and about 25-inch in 150 foot span with a temperature of 60 degrees.

The tension of the strand can be determined either by the oscillating method or by sighting. With the oscillating method an average span is selected five spans or more from where it is being pulled.

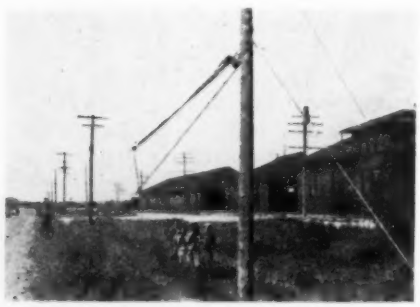


Fig. 2—Triple Block Arrangement for Pulling Messenger

The messenger is started to oscillating or vibrating by a sharp pull and the oscillations counted for a period of 15 seconds. Tables are provided which specify the number of oscillations necessary for certain length spans at a specified temperature. For ordinary cable work in the smaller exchange the sight method will be more desirable and it is a good plan to nail up lath on each pole of the test span to form a target arrangement. A steel square can then be used to determine the exact amount of sag in each span. With this system allowance must be made for the additional sag which will be pulled into the messenger when the weight of the cable is added.

After the messenger is pulled to the proper tension the deadend can be made by using the 3-inch blocks and haven clamps. If the clamp for the main blocks has been properly placed there should not be over 15 or 20 feet between it and the deadend pole. The small blocks should be put on the messenger as far from the pole as possible which is cut off from the reel and the free end given a turn and a half around the strain plates and the other end of the small blocks put on it far enough from the pole to clear the 3-bolt clamps that will be used for the deadend. All slack can be pulled out of this short stretch in this manner and very little will be lost when the main blocks are released and strain placed on the deadend.

When more than one 3-bolt clamp is used about ¼ inch space should be left between them, on the messenger. The messenger can be cut with an approved bolt cutter or nicked with a file and then broken by bending short with a pair of connectors. The ends of the messenger should be bound before cutting to prevent the strand from fraying out. Friction tape is very good for this purpose but small wire can be used. The free end of the messenger should be cut off 6 or 8 inches outside of the last clamp and served down tight with a piece of No. 12 or 14 iron wire.

After the deadend is completed it should be centered on the pole and the large blocks slacked off. The slacking off should be gradual so that the strain does not come on the new deadend with a jerk. The outer end of the big blocks and the clamp can be taken off from a safety strap or a cable car. All blocks should be lowered to the ground with a handline to prevent breakage. All suspension clamps should be placed and thoroughly clamped before the installation of cable rings is started.

Placing Cable Rings

Cable rings should all be equally spaced and set to the messenger firmly so that they will not snap off when the cable is pulled in. Rings for cable up to 200 pair will ordinarily be spaced 20 inches apart and larger sizes 16 inches with a spacing of 12 inches for all sizes over railroad tracks. The 16-inch spacing is preferred for all cables larger than 200 pair. To save time a No. 9 iron wire should be strung out and the rings looped over this before hooking to the messenger. A seat board should be fastened to an ordinary safety strap to form a boatswain chair and the snaps hooked over the messenger. This can be slid along the messenger and will stand on an up or down grade without slipping, which is impossible with a cable car. It also has the advantage of placing a man closer to his work than the cable car, which is desirable for ring work on new construction. A supply of rings should be hung on a wire on the right side of the safety strap so that they are within easy reach of the right hand. A measure should be made out of a piece of No. 9 iron wire with a loop in the center that can be worn on the left hand. The left hand can then be used by the lineman to pull himself along the messenger and to measure and the right one to place the ring on the messenger. With this system after some practice, great speed can be developed.

Pulling in Cable

The reel should ordinarily be placed so that cable will be pulled off from the top. If cable is being pulled in from the center of the span it is a good practice to clamp a short piece of guy wire one

Fig. 3—Cable Reel Set for Pulling Cable Into Rings from Center of Span

end to the main messenger and the other around the hub of the reel cart. A few rings can be placed on this and with two cable rollers at the sharp turns at the top will insure a smooth entrance of the cable into the rings. This arrangement is shown in Fig. 3. If cable is being pulled in from the end pole the down guy can be used for this purpose and when handling very large cables the messenger will not be needed, but the two rollers can be placed one out about 5 feet from the pole and the second on the pole an equal distance below the messenger.

If a long length of cable is to be pulled in some kind of approved lubricant should be provided. Most any kind of hard oil, axle grease or old automobile oil can be used. The hard oil should be applied with a piece of burlap and the oil can be put on with a brush. It is a good practice to lubricate all cables as they are being pulled in as it greatly reduces the pulling in strain and the possibility of displacing rings.

Precaution should be taken on all corners no matter how slight to prevent damage to cables being pulled around them. On corners where the cable pulls away from the pole a cable roller should be used to hold it in line with the rings. When the cable pulls toward the pole place a rope mat saturated with grease between the pole and cable. Rollers of

the type that clamp to the messenger are the most desirable. Cable should never be pulled around a corner where the strain causes the lead armour to flatten even the slightest.

When tap splices are to be made on a cable the proper size lead sleeve should be hung on the messenger with a piece of marlin and the cable pulled through it. This avoids the use of a split sleeve later as they are always a possible chance for trouble.

The ends of cable should lap three or four feet where two pieces meet so that sufficient slack will be available for splicing. When a splice comes in the center of the span, that is when pulling in a piece of cable that ends in the center of the span and a terminal is to be placed on the next pole, then it is best to cut off cable at the pole so that one splice will take care of both as the cable wasted will not be as expensive as the cost of the extra splice. This of course would not hold true with the larger sized cables.

The ends of cables must always be sealed against the entrance of moisture between the time it is pulled in and the time splicing is completed. This can best be accomplished by working the lead out over the core for a distance of about ¾ inches, tearing out the paper lining, rubbing with a candle and running full of

Fig. 4—Woven Wire Grip on Cable

bar solder with a blow torch. With the smaller sized cables the ends can be beat shut and then thoroughly taped. If considerable time is to elapse between the placing and splicing of cable it may be advisable to paint the tape. Many just tape the end of cable, bend the end up, turn a tin can over it and tape down, which appears to be quite satisfactory.

With the smaller cables the No. 9 iron wire can be used for a pulling line up to about 1000 feet, and sometimes more if a good lubricant is used. For large cables a rope should be pulled in with the wire and it used to pull the cable. Regardless of whether the rope or wire is used as a pulling in line the end of the run the farthest from the reel should be taken through a snatch block to hold the line and pull in the center of rings.

The line can best be attached to the cable by a woven wire grip which sells at a small cost. The link where the line is connected to the grip and the back of the grip on the cable should both be thoroughly taped so that there will not be a chance to catch on cable rings.

The woven wire grip in place is shown in Fig. No. 4.

If no woven wire grip is available the lead can be slipped off the cable a distance of about 15 inches and the paper burned off the wire and a hitch made to the conductors by dividing them and turning back and binding. Where they connect to the pulling in line they should be well taped. This hitch if properly made will hold as well as the regular wire grip but of course takes longer to install and waste some cable each time it is used.

A power winch is of course the best arrangement for pulling in cable but a hitch can be made to a truck driven carefully in low gear. With this arrangement use the snatch block and have truck drive toward reel. One man should follow the end of cable through the rings and arrange signals with the truck driver so that he can be stopped suddenly if anything happens. Cable should never be pulled in at a speed greater than 150 to 200 feet per minute. If this speed is exceeded and anything happens there is a danger of damaging the cable before a stop can be made.

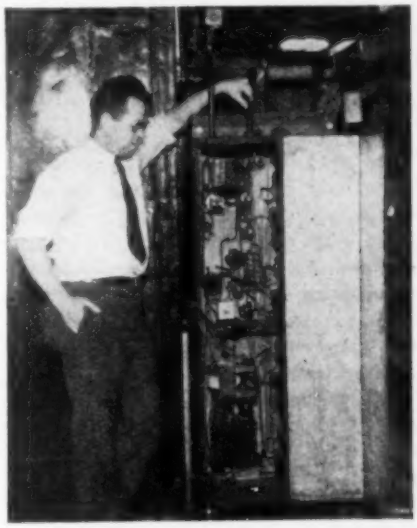
London Clock's Chimes Reproduced in United States

The voice of Big Ben, London's famous clock, has been synthetically reproduced in the United States by radio station KDKA of the Westinghouse Electric and Manufacturing Company.

KDKA first introduced the sound of the great old timekeeper to its listeners by relaying it from London through a short receiving set. Hearing these mellow sounds coming from his speaker, Dr. Frank Conrad, assistant chief engineer of the Westinghouse Company, conceived the idea of reproducing the same sound artificially.

He turned his idea over to V. E. Trouant, radio engineer for application and as a result the replica of Big Ben is broadcast by KDKA exactly upon the hour. The sound is not mentioned by the announcer. It simply is a note in the background of the program whether it be talking or music. At periods when the time is given by an announcer the synthetic bell is not used.

When the sound is described as synthetic, exactly that is meant. It does not mean that a bell has been made which approximates the sound made by the London timepiece. Instead Big Ben is imitated by frequencies imposed on the radio set in Pittsburgh which do not



V. E. Trount, Westinghouse radio engineer, examining the apparatus which synthetically recreates the sound of Big Ben in London, which sound is broadcast from Station KDKA

become sound until they reach the radio speaker.

The tone is created by a number of oscillators, each one giving a certain frequency. These frequencies were selected through an analysis of Big Ben's tones. By combining the frequencies the same signal is carried to the transmitter and sent out on the air as would be produced by sounding the bell itself into a microphone.

To insure absolute accuracy the artificial bell is set off by a seconds beat pendulum clock which operates in a vacuum. The pendulum is made of an alloy which is unaffected by changes in temperature. There are no mechanical connections to the clock, only electrical. The impulse from the pendulum controls a set of gears which in turn close the contact between the pendulum and the group of osciliators exactly on the hour.

Lima Phone Co. Is Given Award

Lima Telephone and Telegraph Co. was recently given the Public Service honor award, a bronze medal, by the Ohio Independent Telephone Association.

The award is given the company in recognition of improvements made and the adoption of a progressive policy. It is the highest honor the association can bestow, and is given at infrequent intervals.

George B. Quatman, vice president of the company, received the medal from Frank L. McKinney, secretary-treasurer of the state organization at Columbus. It is a scroll in cast bronze, mounted on walnut in the form of a Roman shield. A laurel wreath carries the words "For Special Merit" at the top and "Service, Progress, Success" at the bottom.

Transposition Schemes

An Article by B. C. Burden Giving Facts About Transpositions in Plain, Understandable Language

The purpose of transposition in telephone lines is to balance the electrostatic and electro-magnetic fields of one circuit with respect to other circuits on the same lead. This is accomplished by interchanging the wire or pair positions on the cross arm so that neutralizing effects are produced in adjacent untransposed sections.

A consideration of the following fundamental diagrams should enable any wire chief to lay out transposition schemes that will give good crosstalk balance where a relatively small number of circuits are involved.

As the number of circuits on a lead increase above 4 or 5 then the transposition becomes much more complex, and it is generally advisable to use some of the standard transposition schemes worked out by the larger companies.

These standard schemes are generally more costly to apply and are by nature not as flexible as where a transposition design is worked out for each specific case.

The fundamental plan of a transposition scheme between two paralleling non-phantomed circuits is shown in Fig. 1.

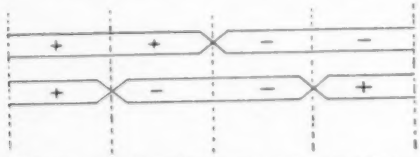


Figure 1.—Fundamental Transposition Balanced Unit.

Note.—Plus and minus signs are used to determine if the circuits in a given scheme are balanced with respect to crosstalk. This method of determining balance does not take into account the effect of phase change nor attenuation, but if sufficiently accurate for all rural line or short trunk transposition design, provided the distance between transposition points is not too large.

The method consists in starting at one end of a schematic showing either the actual or a theoretical proposed transposition scheme, and calling the distance from start to first transposition plus and then minus as a transposition is passed, and alternately changing the sign as transpositions points are passed. This is done for both circuits under consideration. The next step is to add the plus and minus signs of each circuit vertically by calling like signs plus and unlike signs minus. For good crosstalk balance between the circuits under consideration the sum of the plus and minus signs should be equal.

The basis of this method is the fact that a 180 degree phase change takes place on opposite sides of a transposition and results in equal and directly opposing voltages being built up in adjacent untransposed circuits which neutralizes the cross-talking tendency. The vertical addition described merely summarizes the relative lengths or number of plus and minus units, so as to determine whether or not complete neutralization has taken place.

For transposition design in connection with rural lines it is not necessary to have all circuits on a lead plus and minus out to each other, but mainly the adjacent circuits. The reason for this is apparent from a consideration of the cross-talking tendencies between the various circuits on an arm.

We will refer to the arrangement represented in this figure as a "balanced unit." The transposition design for a non-phantomed lead involves merely the proper arrangement of a number of the units shown.

Three Requirements That a Transposition Scheme Must Meet.

In the design of even a simple transposition scheme there are three requirements which any transposition scheme should meet, viz.:

1. The balanced units must be short enough so that phase change and attenuation do not cause incomplete neutralization. This distance is about one-half mile in the design of the standard transposition schemes used on long distant toll lines (for adjacent circuits). For rural circuits and non-important short trunks, this distance may be increased to 1 mile and in some cases more without incurring noticeable crosstalk.

2. Each circuit should have an equal number of plus and minus sections. This is necessary in order that the circuit will be balanced to ground. For example, in a parallel of circuits on pins 1-2 and 3-4 it would be possible to obtain an apparent balance by placing transpositions in circuit 3-4 only, but if we study the relative wire positions we will see that wire 2 would have a greater capacity to earth inasmuch as it is adjacent to wire 3, which likewise has capacity to earth. This unbalanced capacity to earth if of sufficient magnitude would tend to set up crosstalk currents in circuit 1-2.

3. To obtain a complete crosstalk balance, the sum of the plus and minus signs for any two circuits under consideration must be equal. This requirement must not be confused with that of 2, for whereas 2 calls for a balance of plus and minus signs on an individual circuit, requirement 3 calls for a balance of signs or any two circuits under consideration. This addition is made by calling like signs plus and unlike signs minus when added vertically. See note under Fig. 1.

Problems in Transposition Design for Small Leads.

As previously stated transportation design becomes more complex as the number of circuits are increased. Up to five circuits it is comparatively easy (if the fundamental theory of a balanced unit is appreciated) to design an economical transposition scheme. Fig. 2 illustrates an ideal transposition scheme suitable for rural line transposition design on circuits up and including 12 wires. This scheme was designed with the idea of balancing the telephone lines in each mile, then if power line parallels are involved it is only necessary to co-ordinate the power transpositions with the telephone scheme by arranging all power line transpositions so as to fall on section lines which are neutral points in the telephone scheme. With power companies everywhere going after the rural power business some definite scheme that will permit of good co-ordination with power lines is very essential.

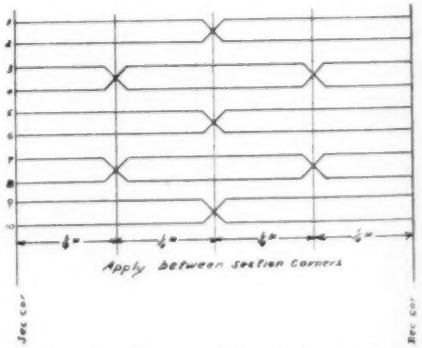


Figure 2.—Transposition Scheme Suitable for Rural Lines Up to 12 Wires.

It is of course possible to stretch the scheme shown out to two or even four miles without materially disturbing the crosstalk balance. However, for the reasons stated above, it would be best to

install this scheme in a uniform manner because of the possibility of power line parallels.

In the design of transposition schemes for regular toll lines it is necessary to devise schemes that balance any circuit against any other circuit that might be carried on a lead. This greatly increases the complexity of the design problem. However, in the design of transposition schemes for short toll trunks or the regular rural lines, the design is greatly simplified due to the fact that the greater separation between circuits on non-adjacent pin positions reduces the magnitude of the crosstalking tendency. A reduction is also obtained from the shielding effect of interposed wires. For this reason it is not generally necessary to balance all circuits against each other for schemes used on these relatively

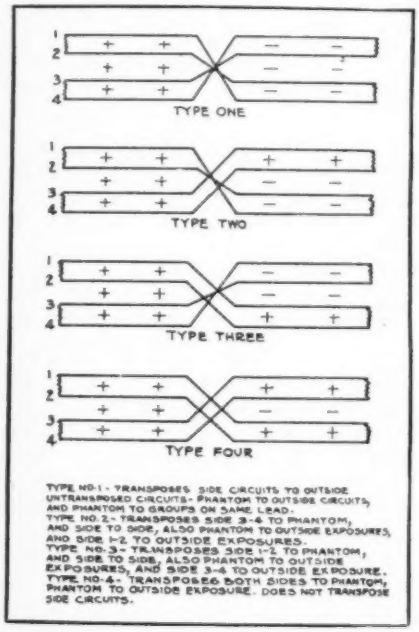

TYPE ONE
TYPE TWO
TYPE THREE
TYPE FOUR
TYPE NO.1 - TRANSPOSES SIDE CIRCUITS TO OUTSIDE UNTRANSPOSED CIRCUITS- PHANTOM TO OUTSIDE CIRCUITS, AND PHANTOM TO GROUPS ON SAME LEAD.
TYPE NO.2 - TRANSPOSES SIDE 3-4 TO PHANTOM, AND SIDE TO SIDE, ALSO PHANTOM TO OUTSIDE EXPOSURES, AND SIDE 1-2 TO OUTSIDE EXPOSURES.
TYPE NO.3 - TRANSPOSES SIDE 1-2 TO PHANTOM, AND SIDE TO SIDE, ALSO PHANTOM TO OUTSIDE EXPOSURES, AND SIDE 3-4 TO OUTSIDE EXPOSURE.
TYPE NO.4 - TRANSPOSES BOTH SIDES TO PHANTOM, PHANTOM TO OUTSIDE EXPOSURE. DOES NOT TRANSPOSE SIDE CIRCUITS.

Figure 3.—Four Types of Phantom Transpositions and Their Effects.

short circuits. The following table indicates the relative crosstalking tendency between the various circuits on a one arm (five circuit) lead:

Crosstalking Tendency Between the Various Circuits on a Five Circuit Non-Phantomed Lead.

Between circuits. Pins.	Miles of Untransposed length permissible for rural circuits.
1-2 to 3-4	.75 mile
7-8 to 9-10	.75 mile
3-4 to 5-6	.50 mile
7-8 to 5-6	.50 mile
1-2 to 5-6	6.00 mile
9-10 to 5-6	6.00 mile
1-2 to 7-8	46.00 mile
9-10 to 3-4	46.00 mile
1-2 to 9-10	70.00 mile

Crosstalking Tendency Between the Various Circuits on a One Arm (five circuits) Phantomed Lead.

Between sides and phantoms. Pins.	Miles of untransposed length permissible for rural circuits.
1-2 to 1-4	.35 mile
3-4 to 1-4	.45 mile
9-10 to 7-10	.35 mile
7-8 to 7-10	.45 mile
3-4 to 7-10	4.00 mile

*Note.—The above mileage values indicate the untransposed distances which would not give rise to objectionable crosstalk on the class circuits considered.

Note.—A very interesting discussion covering the relationship between all of the circuits on a forty wire lead is to be found in "Proceedings of American Institute of Electrical Eng.," July, 1918.

It will be noted in the above tables that there is a large difference in the inductive effects between adjacent circuits and those between non-adjacent circuits. Fig. 2 utilizes this fact on the assumption that in the ordinary leads commonly found on rural exchanges, the unbalanced circuits seldom exceed the permissible lengths as given in the tables before they branch off.

Phantom Transpositions.

The use of phantom circuits on a lead makes transposition design work much more difficult.

In dealing with phantom open wire circuits we have the following crosstalk conditions which we must balance out with the proper transpositions.

1. Crosstalk between the phantom circuit and the physical circuit which carries it.
2. Crosstalk between the phantom and other physical circuits on the same lead.
3. Crosstalk between the phantom circuit and other phantoms.
4. Crosstalk between sides of the phantom group to each other.

If two physical transpositions are placed at the same point in a phantom open wire group the crosstalk from phantom to sides will be balanced out. If only a phantom group were to be considered then the use of two physical transpositions at the same point with an occasional single transposition to balance side to side crosstalk would be all the transpositions necessary to obtain a good balance.

But most leads carry more than one phantom group and it is therefore necessary to change pin positions of the side circuits of the phantom group in order to balance the capacity of the phantom wires to earth as well as change the phase of crosstalk induction into other phantom groups on the same lead.

A pin position shift of the sides of a phantom group is referred to as a "phantom transposition."

There are four ways of making phantom transpositions known, respectively, as types 1, 2, 3, and 4.

The effect of each type of phantom transposition in the induction into other circuits and to its own sides is indicated in Fig. 3.

Reasons for Having Four Types of Phantom Transpositions.

There are two general reasons for having four separate types of phantom transpositions. In the first place there are just that many possible ways of making phantom transpositions, then their characteristics make them economical to use in combination, as they save in the total number of transpositions that would be required were only one type used.

This latter fact is apparent if a combination of a type 2 and 3 placed at the quarter and three-quarter points in a given length phantom group is considered. It will be noted that complete balance is obtained between sides and phantom and side to side with this combination.

A type 1 transposition has no effect on crosstalk balance within its own group but transposes both sides and phantom to outside telephone or power circuits. Type 2 balances out crosstalk between side 1-2 and side 3-4, also between side

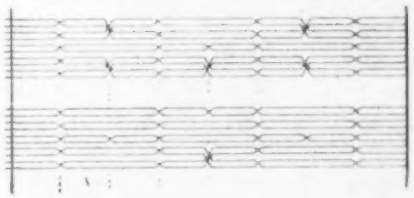


Figure 4.—Typical Phantom Transposition Scheme Used on Toll Circuits.

3-4 and the phantom. It likewise balances the phantom to outside exposure. It does not balance out crosstalk between side 1-2 and the phantom. Type 3 balances out crosstalk between side 1-2 and 3-4, 1-2 to phantom and the phantom to outside exposure. It does not balance out crosstalk between side 3-4 to phantom. Type 4 balances both sides to phantom and phantom to outside exposure, but does not balance side to side.

Fig. 4 illustrates how phantom transpositions are used in a regular transposition scheme. The scheme shown is adapted for 8 mile sections of regular toll line and provided a good balance for all the circuits on a 40 wire lead. Only the transpositions in the first two arms are shown. In fig. 5 the same scheme is shown but with the physical transpositions not shown in order to illustrate how the phantom transpositions are effective in reducing crosstalk between groups.

Phantom Transportation on Rural Lines.

The necessity for phantom transposi-

tions on rural lines is determined by three factors.

1. The number of groups phantomed on the lead.

2. The length of the respective circuits involved.

3. The presence of paralleling high voltage power lines.

If there is but one phantom group on a lead which is not more than 2 miles in length it is generally not necessary to use phantom transpositions.

Where a high voltage power line parallels a rural phantom group for even a mile it is generally necessary to phantom transpose the group at the proper point in order to balance out power noise.

The location of phantom transpositions for the balancing of group to group crosstalk follows the same plan explained in the paragraph on "balanced units."

The distance from an office out to the phantom coils on most rural leads is usually but a few miles hence group to group (in the case of more than one phantom group) crosstalk is not generally bothersome even though no effort is made to balance it out.

Where only one phantom group and

Figure 5.—Same Transposition Scheme as in Fig. 4 but with Physical Transposition Omitted to Show the Effect of Phantom Transpositions.

a number of physical circuits exist on a rural lead, then a single type 1 at the mid-point together with a sufficient number of physicals to balance out phantom to side, and side to side crosstalk should give a good balance.

Remember that transposing both sides of a phantom group at the same point reduces crosstalk between either side and the phantom.

In working with phantom transpositions it should be noted that the phantom transposition causes the sides to shift pin positions and hence changes the magnitude of the induction between side circuits of the phantom and other circuits on the same lead on opposite sides of the point at which the phantom transposition occurs.

For this reason in laying out a transposition scheme the crosstalk between physical circuits adjacent to the phantom circuit group should be balanced out independently on opposite sides of the phantom transposition point, if possible though this is not as essential as it might seem.

In the forepart of this article a compound phantom was described. If compound phantoms were used the transposition scheme would be extremely complicated due to the necessity of balancing the compound as well as the regular phantom circuits. Inasmuch as compound phantom are seldom if ever used, no attempt will be made to discuss a suitable set of transpositions.

Vertical Pole Pair Phantom Circuits.

On the long distance toll lines that extend over the country full advantage is usually taken of phantoming arrangements. The circuits generally phan-

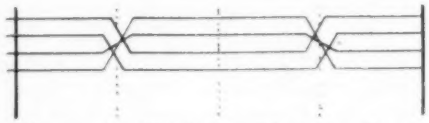


Figure 6.—Obtaining Phantom Group Balance with a Type 2 and Type 3.

tomed on a two arm lead are the 1-2, 7-10, 11-14, 17-20 and the (5-6, 15-16) groups. This last group is known as the "vertical pole pair phantom group" and differs somewhat from the other phantom groups which are usually referred to as "horizontal phantom groups," in its crosstalking tendencies. A vertical pole phantom group may be untransposed for miles and no crosstalk will be induced between phantom and sides of this group. The reason for this is that the phantom current flowing in the same direction in both wires of 5-6 induces current in the sides of 15-16 or 5-6 which likewise flows in the same direction in both wires, hence is not effective in creating crosstalk. For the reasons just cited it is always desirable to place brackets in a horizontal plane where a four wire bracket lead is to be phantomed.

However, transposition in the vertical pole pair phantom circuits are necessary to reduce side to side crosstalk, as well as group to group and group to other side circuits.

Transposition of Half-Phantom Circuits.

It is impossible to transpose half-phantom circuits for the reduction of crosstalk for the same reasons that grounded circuits cannot be transposed. Relief from crosstalk between half phantom circuits on the same lead can usually be obtained in short parallels by locating circuits of this type on non-adjacent pins positions, preferably 1-2 and 9-10.

The Growth of the Telephone

Figures were quoted at the convention of the Telephone Pioneers of America in Minneapolis recently to the effect that there are more than three times as many employes of the Bell telephone system than there are officers and enlisted men in the United States army.

The tremendous growth of industries catering to convenience and comfort as contrasted with basic necessities is amazing.

Think of referring to men only 21 years in an industry as "pioneers." Yet the telephone business has grown up in little more than that length of time. Men and women without a white hair in their heads recall the days when the telephone was a novelty.

Now the users of telephones have at their service a force three times as large as the army to keep their lines working and in repair.

Telephone service and its ramifications call for an expenditure of $153,000 every hour of the day.

The Home Telephone and Telegraph Company Organizes Supervisors and Foremen.

Organization of supervisors and foremen of the plant department of The Home Telephone & Telegraph Company, Fort Wayne, Ind., into a group which will conduct monthly educational meetings was effected recently at the initial session of these employes, at the Company's Warehouse Auditorium. H. E. Gray is general plant superintendent and chief engineer of the Fort Wayne Company.

The group, comprising 28 members, was organized to insure efficient cooperation among the supervisors and foremen of the department and to establish a forum where company policies and problems may be discussed.

Frank J. Baker, assistant general plant superintendent, was appointed chairman of the organization and Ed Bogenschuetz, chief clerk of the equipment department, secretary. A committee comprising supervisors in the different divisions of the company was also appointed. This committee will prepare the programs of the meetings, subject to the approval of the company. Members of this appointed group are as follows: R. Johnson, Geo. Wagner, R. B. Gallup, A. J. Staub, Boyd Haney, E. J. Bogenschuetz and Walter Ellis.

The meetings, which will be under the auspices of The Home Telephone Athletic Association, will be presided over by the chairman. The sessions will be held the second Thursday evening of each month, following a supper which will be served to the members at 5 o'clock. The following are members of the group: R. Johnson, H. Scherman, W. Eisenhut, H. Beltz, J. Ostrander, Geo. Wagner, D. McIntosh, W. J. Fisher, T. Wappas, C. Morton, W. Miller, W. Darrow, N. Zimmerman, R. Tracy, R. McDonald, Wm. Johnson, R. Bowers, R. B. Gallup, F. Ferguson, A. J. Staub, L. Wire, O. G. Reuter, Boyd Haney, Leo Moulin, R. Ellingwood, H. Smith, E. J. Bogenschuetz, Don. Plye, R. R. Rex, Ralph Harris and Walter Ellis.

Multiple Channel Program Service

O. C. LEVY

Development Engineer, Automatic Electric Co.

The steady growth and increasing importance of Program Service is fittingly attested by the fact that we are meeting here today for the first time as the Program Service Section of the United States Independent Telephone Association. Nevertheless, the optimism inspired within us by this progress should not prevent us from analyzing our situation to find out what factors were most influential in promoting this growth and from seeking further for means of continuing and accelerating it.

To begin with, the question may be asked, "Why program service at all?" There are, of course, many reasons, but outstanding among them may be mentioned three. First, program service supplies a high quality program to a large class to whom the high cost of a good radio set is, if not prohibitive, at least a strong deterrent to purchasing, even under the present widespread system of installment merchandising. Second, the depreciation of a privately-owned radio set is very high. Even the most expensive of the battery operated sets of two years ago has been rendered practically worthless in metropolitan areas by the advance of the A. C. operated set, and the A. C. set of a year ago is now being swept into obsolescence by the popular trend to the screen-grid tube equipped set. The third reason, I think, lies within the experience of all of us. There is a strong tendency on the part of a listener to tune his, or her, radio set to some favorite station whose program is, on the whole, satisfying, and not to change the tuning until some number is presented which is so displeasing as to be actually annoying. Then the tuning is changed, not by seeking among a multiplicity of station announcements under the additional handicap imposed by the tendency of newspapers having associated radio stations to emphasize their own programs almost to the exclusion of others; but rather by changing to some familiar second-choice station. The result is that many a really interesting program is overlooked and missed. The program service subscriber, on the other hand, has presented to him a series of programs deliberately chosen by a competent staff from among the best programs on the air.

The single channel, or one program at a time, program service, though it may offer certain advantages over the privately owned radio set, is at the same time open to numerous objections. For one thing, we instinctively rebel at having anything forced upon us. Certainly, the choice between a distasteful program and no program is not much of a choice. Further, the best that can be done on a single channel is to alternate the different types of program, speeches, music, classical or jazz, at as short intervals as practicable in an endeavor to satisfy as many subscribers as possible at all times. This is obviously unsatisfactory to a program service company which must, if it is to prosper, satisfy, as far as is humanly possible, all of its subscribers at all times.

This same reason which, coupled with the increasing supply of available program sources, carried radio broadcasting from a single chain of stations to the present situation of three or more chains serving the same territory, must inevitably lead program service to the same end, multiple channel service. Multiple channel service, making it possible for the subscriber to exercise some choice in his entertainment, may involve two, three, or more programs.

The use of two programs goes a long way toward overcoming opposition to the use of program service because of lack of choice. It enables two outstanding programs from the principal radio chains to be presented simultaneously. It enables one channel to be reserved for one particular type of service, such as music, while the other is used for talks, broadcasts of sporting events, and similar affairs. But in merely offering a choice between a musical program and a mixed program the difficulty has only been ameliorated, and not solved. The lover of classical music who does not care for the alternative program is still unsatisfied if the musical program is popular in nature, and conversely the popular music "fan" is equally dissatisfied with a classical program.

Still another factor presents itself in considering the number of programs required to give complete satisfaction. In the words of the chief engineer of one operating company which has been a pioneer in this field, "I believe it is the universal opinion of every radio listener that there is entirely too much announcing done; that is, too much talking by the announcer, and we have found that the third program should have absolutely no announcing whatever. This program consists of entirely popular music, unless both of the other programs have popular music, and there is no announcing, not even the name of the piece."

A third program, then, largely of local origin, that is to say, phonograph records, and properly selected to provide the elements missing in the other two programs drawn from radio sources can be seen to provide a very good solution to the difficult problem of satisfying all of the subscribers all of the time. However, a fact that must not be lost sight of is that public taste becomes increasingly critical with familiarity and the demand for better and better service correspondingly greater. At the same time the increase in program service subscribers serves also to increase the variety of tastes which must be satisfied. Consequently, the possible future requirement for a fourth and perhaps fifth program should be borne in mind while considering the program arrangement and the type of selecting equipment which the program service subscriber must necessarily use.

An immediate use for a fourth channel may very well be for the provision of time service. This has always been one of the telephone operating company's most burdensome problems because of the public demands or charter requirements for this service on the one hand and the seeming reluctance of rate commissions to approve the inclusion of a charge for time service in the rate structure, on the other. The spread of program service which includes a time service feature may yet prove to be the solution of this difficult problem.

This service also provides an identification point for determining the setting of the selector and from which the subscriber can locate a desired program.

The reasons pointed out for the use of three or more program channels constitute, of course, only one side of the picture. Multi-program service is more valuable, not alone to the operating company in overcoming sales resistance and spreading the popularity of the service, but to the subscriber as well in more fully satisfying his individual requirements. Such service justifiably commands a higher rental than single program service and thereby serves to increase the operating revenue without unduly increasing the cost of providing service.

In choosing the type of selecting equipment which must be used, not only the central office requirements of simplicity of design and low maintenance must be considered, but also the simplicity of operation and appeal to the subscriber. The transition from the early radio receiver with its multitude of dials and controls to the present single

*Paper presented at convention of United States Independent Telephone Association.

dial, directly calibrated set has been rapid and final. The program selector must be equally simple or even easier to operate. The boast that "even the smallest child can operate it" must not be an empty one. Ours has been called a "Push Button Age" and therefore the choice of a single push button for the subscriber's operating medium is apt enough. Furthermore, it meets the requirement of being simpler to operate than a single dial radio set and possesses, in addition, a distinct appeal to the mystery loving element of the public mind which still regards a radio receiver as somewhat of a miracle, albeit a familiar one.

Quoting again from operating experience, "The fact that the program can be changed by merely pressing a button has proven to be very popular with the subscribers, as it adds materially to the mystery of radio and most people like to look upon radio as being a mystery. It is not so hard to understand that when you turn a dial from one point to another you would change the selection of program, but by merely pressing the same button several times and still getting different programs has proven to be quite a novelty and has taken well with the public."

Two types of program selectors which embody all of the foregoing requirements have been developed for use with program services in which the program is distributed at audio frequency over a direct pair of wires to the subscriber. One type provides for choice between two programs only with no possibility of subsequent expansion. The other type permits selection of up to five programs and is the most generally applicable.

Considering first the simple, two-program selector, it will be found to consist, like the multi-program selector, of standard telephone parts. It consists of a magneto type ring-up and cut-off relay assembly carrying the necessary switching springs. The circuit is so arranged that one of the two available programs is normally coupled to the subscriber's line by means of condensers. The ring-up relay can then be operated over one side of the line when the subscriber grounds the line through the push button. This first operation of the push button locks up the ring-up relay mechanically and transfers the line to the second program. A second operation of the push button causes the cut-off relay to operate, thereby restoring the ring-up relay and returning the line to the first program. These relays, together with the associated condensers, are arranged to mount on relay strips and regular manual type racks.

The multi-program selector, mechanically, is built on a service meter frame, the number wheels being removed and an extended shaft added. This rotating shaft carries five cam wheels which are arranged to operate spring assemblies in sequence as the selector is stepped around. The meter coil serves as both an operating coil for the selector and as a line relay, since it operates directly over the subscriber's loop. The operating coil is double wound and may be used in two different circuits. In the one circuit the coil serves as a double wound line relay and the subscriber's push button is arranged to short the loop. This type of operation, of course, makes it necessary to insert a condenser in series with the loud speaker to avoid having the line normally short circuited.

The other circuit uses both coils in series to operate over one side of the loop to ground at the subscriber's push button. In either case, the subscriber's loop is coupled to the various programs at the selector by means of a single pair of condensers.

There are several auxiliary circuit arrangements which may be used to obtain certain desirable supervisory or balancing features. The program selecting springs may be arranged as break-make combinations so that if it should be found desirable to maintain a constant load upon the program amplifiers regardless of the number of subscribers using a particular program, the back contacts may be used to connect in an artificial load equivalent to the subscriber's loop and loud speaker.

Since the subscriber's loops are normally open circuits as far as the operating coil of the selector is concerned, it would be desirable to supervise against a short circuited or grounded condition which would not only leave the selector permanently energized but might throw an exceptionally heavy load upon the amplifiers. To supervise against this condition, the selector may be equipped with a pair of springs which close a delayed alarm circuit when the selector is operated. Should the selector remain operated for a period of any length, an alarm will be brought in and the line in trouble indicated by supervisory signals in the same manner that it is accomplished in a telephone plant.

The relative popularity of the different programs offered as judged by the number of subscribers using each one is, of course, a question of vital interest to the operating company. This information may be obtained by the use of a program selector equipped with three sets of make contacts per program in place of the previously described selector having two sets of break-make contacts per program. The extra set of make contacts is here used to close a circuit through a resistance individual to the selector to a common ammeter for that program. The ammeter reading will then be proportional to the number of resistances in circuit and consequently to the number of subscribers using that particular program. No provision is made on this selector for artificially loading the amplifiers as it is the opinion of many engineers that perfectly satisfactory operation may be obtained without this feature.

The selectors can be mounted in two different fashions, either of which provides a compact and easily accessible arrangement. In the one type, five selectors, together with their associated coupling condensers, are mounted upon a strip similar to a manual relay strip and wired complete to a small terminal block placed at one end. Each strip is provided with a cover which completely encloses the selectors and shields them from magnetic interference, as well as protecting them from mechanical injury and dust. The strips are mounted upon racks similar to regular manual relay racks.

The other type of mounting is similar to that used in mounting automatic telephone equipment. Five selectors, together with their associated coupling condensers, are mounted upon a steel base about the size of a connector base, that is to say, about 18" long by 5" wide. All connections are wired to jacks so that the units are completely self contained. In this model, each selector is provided with an individual cover to shield it from magnetic interference. The units mount in five switch space connector shelves. The shelves, in turn, are mounted very compactly back to back upon channel iron uprights some eight shelves high, an arrangement that is very economical of floor space.

These selectors will operate satisfactorily over subscriber's line loops up to 500ω in resistance when using a 48 volt battery.

In closing, we may conclude from the reasons given here that one of the most important factors involved in promoting the future growth of program service is the provision for subscriber selection among several programs of diversified character.

Coleta Exchange Merger

The newly incorporated Northwest Telephone Co. of Freeport will absorb five independent telephone companies as soon as permission is secured from the state commerce commission. The Coleta Telephone Co., the Polo Telephone Co., Pitcher Telephone Co., Pearl City Telephone Co., and the Lancaster and Cedarville Telephone Co., are the ones consolidated. The Pitcher company has 17 exchanges in Jo Daviess county, and the Pearl City company also has exchanges at Lena and McConnell.

800,000 ADDITIONAL TELEPHONES ARE GOING INTO USE THIS YEAR

A million and a half dollars a day

An Advertisement of the
American Telephone and Telegraph Company

MORE than 200 new Bell telephone buildings are going up this year in the United States, 800,000 additional telephones are going into use and new switchboards to care for 3,000,000 additional calls a day.

Thousands of miles of new cable, millions of miles of wire, new carrier systems, vacuum tubes and loading coils. These are a few of the things in the 1929 construction and improvement program of the Bell System which will cost more than 550 million dollars—a million and a half a day.

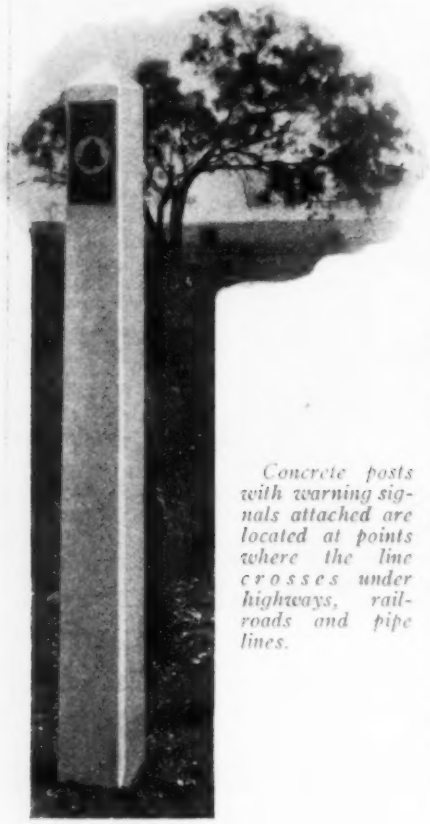
Telephone growth is essential to the new American civilization of better opportunity for the average man. The Bell System employs more than 400,000 workers, is owned by 450,000 stockholders, and serves the people of the nation.

Every day the Bell System is extending its lines to more people, increasing the speed and accuracy of its service, giving greater comfort and convenience in telephone use. All of this is done that each individual may get the most from this means of all inclusive and instantaneous communication and that the nation may be one neighborhood.

This is part of the telephone ideal that anyone, anywhere, shall be able to talk quickly and at reasonable cost with anyone, anywhere else. There is no standing still in the Bell System.

New Types of Buried Toll Cables

The rapid growth of toll telephone traffic throughout the Bell System during recent years has necessitated the increasing use of cables in areas in which the traffic could have been handled adequately a few years ago over open wire lines. On many of the routes comprising this constantly growing network of cable facilities, where the cost of conduit could not be justified, aerial cable would normally be employed. Realizing, however, that underground cable has definite advantages, Bell System engineers have given much study to the problem of finding more economical methods of installing this type of cable on long toll lines.



Concrete posts with warning signals attached are located at points where the line crosses under highways, railroads and pipe lines.

The solution of this problem has been reached by the introduction of two methods of installing underground cable that are new in the Bell System. One of these employs a cable buried in the ground, without conduit. In order to protect the sheath from earth corrosion and mechanical damage, the cable is provided with coverings of impregnated paper, jute and steel tape. The second method consists in laying a single fibre conduit and pulling the usual type of lead covered cable into it by means of a power winch line. Under both methods, manholes are placed at loading points only, and thus it is possible to eliminate about ninety per cent of the manholes employed in the more familiar conduit construction.

The first of the Associated Companies of the Bell System to use these new types of construction is the Southwestern Bell Telephone Company. This company's toll cable program for the years 1929-33 calls for the construction of a network extending from St. Joseph, Mo., on the north, to San Antonio, Tex., on the south, and from Memphis, Tenn., on the east, to Sweetwater, Tex., on the west, with branches and extensions to many other important cities.

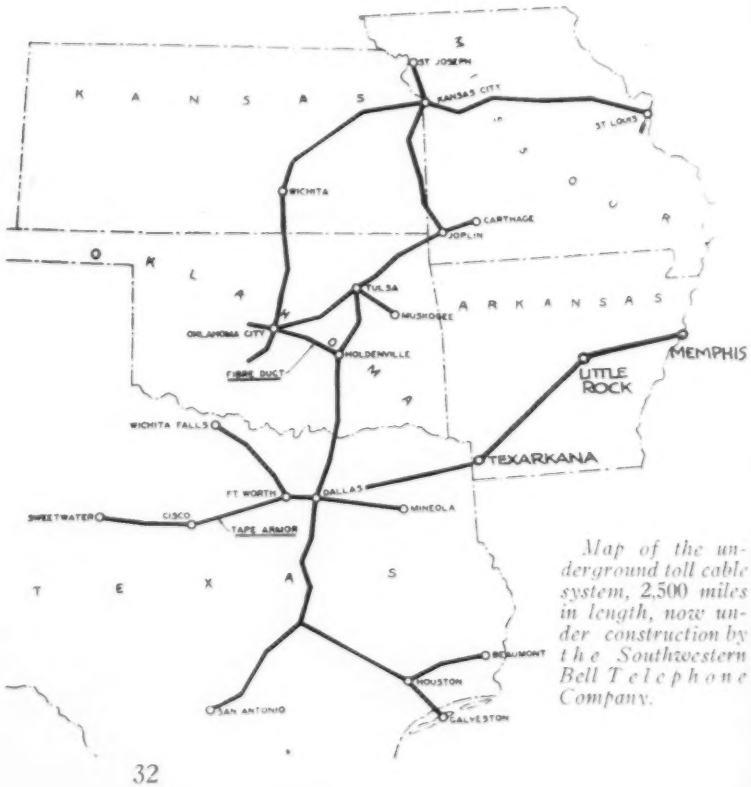
In general, buried toll cable is located on private property, which usually permits the selection of the shortest possible route. The cable runs straight across country, like a pole line, frequently at some distance from highways and railroads. This feature, while effecting economies in the cost of cable itself, presents many difficult problems in the transportation and handling of materials and in the actual work of installation.

In order to carry out the work of laying the cable expeditiously and economically, new procedures of construction have been required, and in many cases it has been necessary to develop entirely new forms of labor-saving machinery. Much of this machinery has been designed for this specific purpose by Bell System engineers, while in other cases it was necessary to adapt commercial machinery to meet the requirements of the work.

Special trenching and backfilling machines are used in soft ground. A tractor plow has been provided for work in loose rock. On one stretch of the route,

(*Continued on page 38*)

In Texas along the Cisco-Fort Worth right-of-way after the clearing had been made, the trench dug and the cable laid.



Map of the underground toll cable system, 2,500 miles in length, now under construction by the Southwestern Bell Telephone Company.

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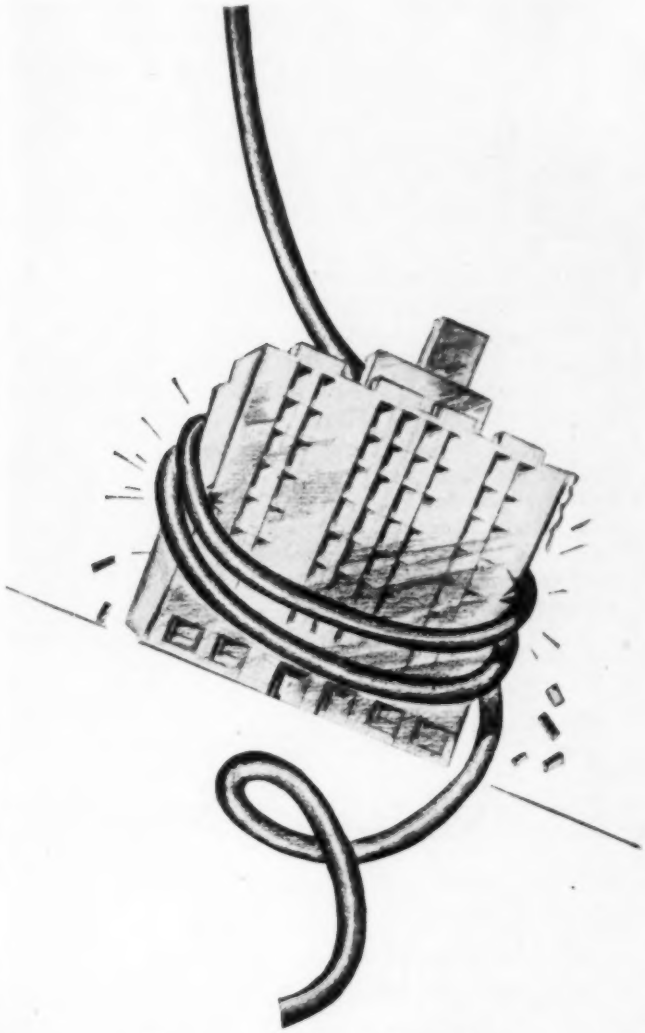
GALVANIZED PRODUCTS

The pure zinc coating on *Crapo* Galvanized Telephone Wire and Strand is *non-peeling, non-cracking*. Even when subjected to splicing, twisting or bending, this protective coating remains uninjured.

That is why *Crapo* Galvanized Products are outlasting all others in actual service. That is why users, year after year, are reducing maintenance costs to new low levels....

Crapo Galvanized Telephone Wire and Strand can be obtained from representative Jobbers. Insist upon *Crapo* quality! You can identify it by the *Crapo* Tag....

Indiana Steel & Wire Co.,
Muncie, Indiana



It can choke up an entire exchange

A bit of defective cable can throttle traffic on busy lines . . . annoy subscribers . . . throw a whole system in disorder . . .

"Unbroken service"—the watchword of the telephone industry—is synonymous with Western Electric lead-covered cable . . . the cable used in more than half the telephone lines in the world . . . . . not the cheapest cable, perhaps, but certainly the most economical in terms of service.

Here you have the experience of 47 years . . . the standards of the largest organization of cable experts in the world . . . the constant inspection and reinspection in manufacturing . . . the testing and re-testing . . . result; the "nearly-perfect" cable.

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Successor to *Western Electric* Supply Dept.

Offices in 73 principal cities. GRAYBAR ELECTRIC CO., Graybar Bldg., 420 Lexington Ave., New York

HOTEL ATLANTIC

Famous for food

CLARK ST. NEAR JACKSON BLVD.

MOST CENTRALLY LOCATED

ONE BLOCK FROM LASALLE STATION, POST OFFICE, AND BOARD OF TRADE.

450 ROOMS
$2.00 UP

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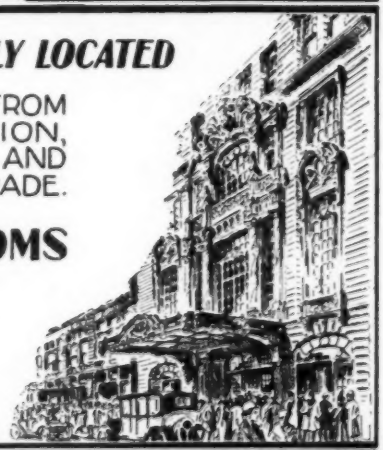


CHICAGO

LINE AND DESK

ANOTHER METHOD OF LOCATING ANCHORS.

I notice with interest Ray Blain's description of a method for finding the correct, or bisecting, angle for placing guys and anchors on pole leads.

I desire to describe another method, not original with myself, however, of locating the angle when an obstacle such as a shed, building, etc., might be in the way along the line B-C. It can also be used on corners on rural and toll leads with sufficient accuracy.

In my drawing, Fig. 1, we will say the man at B has a tape which is unrolled to some even number, say 30 feet, with a man, C, at the other end. The foreman, or a man at A, now has the men move until the tape at A, resting against a shovel handle stuck in the ground, reads half of the distance B.A.C., in this case 15 feet. The men, B and C, are also "sighted in" in line with the lead behind them, by A. Now the man with the tape at B lets, say, two or four feet of tape slip slowly through his fingers, being careful not to move them out of line or forward or backward, and A pulls out against the tape with a finger in the approximate direction, A-E. When B has let out the proper amount of tape, say 4 feet, he holds his end, and A can then add one-half of the distance B has let out, or 2 feet, to the original reading, or 15 feet, which gives, in this case, 17 feet. Now A slides his finger along the tape, holding it taut by outward pressure, to the point D, 17 feet on the tape, where another shovel can be set or a man stationed, giving the points A-D to sight in the line A-E. Since A-B and B-C are equal, and A-D and D-C are equal, A-E bisects the corner angle.

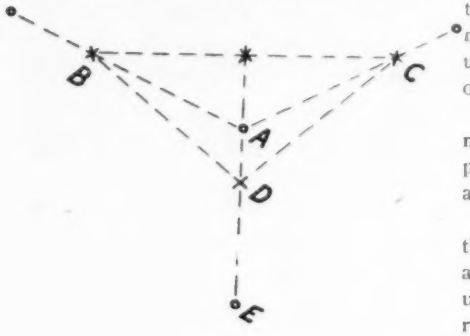


Fig. 1

After the first few times this process is very simple and easy and not nearly as complicated as the description sounds.

I hope it will be of value to some of your readers.—Contributed by Eugene Davis.

MENTAL FOG

Most accidents occur when the mind and body aren't working together. A man's hands may be on the steering wheel of an automobile while his mind is a long way off. His feet may be stepping into the street while his head is up in the clouds, so to speak. He may be thinking about something, or his mind may be a perfect blank. Then something unexpected happens, and another accident occurs.

Often after the accident the injured man can't give a clear story of what took place. He was thinking about something and doing something else, and then—

Two or three drinks will produce a thick fog in some people. It isn't necessaary to be completely potted to become unfitted to drive or walk. Anyone arrested after an accident with a breath like the atmosphere of an old time barroom may have a hard job convincing the judge that he is sober.

But even total abstainers sometimes get fogged. Going to bed the same day you get up several times in one week is one way of gumming up the thinking processes. Overeating and lack of exercise is another way.

Others whose digestions are working efficiently have the habit of day dreaming. Everyone does it at times, but the only safe place for this sport is an easy chair at home. It's too risky in this age of high-powered machinery and high speed traffic.—Rochester Telephone Bulletin.

SUBMARINE CABLE PLACED AT DECATUR, ALA.

A submarine cable, 2,200 feet long, carrying the Nashville-Montgomery toll line and the Decatur-Chattanooga toll line, was placed across the Tennessee River above Decatur, Ala., on September 13. This cable consisted of a single armor, special 39 quad, submarine cable in two sections of 1,000 feet and 1,200 feet long.

The United States Government required the cable to be laid below the bed of the river, making it necessary to cut a ditch three feet deep across the river, which was done by use of a clam shell bucket operated on a truck and derrick.

This equipment was assembled by the Buchanan Construction Company, of Birmingham, under the supervision of Supervising Foreman of Construction E. L. Helvin and Line Foreman R. C. Brown.

The cable terminated in the middle of the river in one of the concrete piers which support the draw span of the new concrete highway bridge recently constructed. At this point a special load coil was installed. One of the difficulties encountered on this job was an eight-foot rise in the river over a period of eight hours, making it necessary for the workmen to do some of their work under water. The splicing and loading of this cable was done under the supervision of B. D. Hight, supervisor of cable testing.

The placing of this cable under the bed of the river, with the difficulties encountered, was satisfactorily accomplished.

SELECTING AND TRAINING DIAL SWITCHMEN

In the years 1929 and 1930, two new dial offices, No. 2 and No. 8, will be installed at Birmingham. The installation of these two offices with additional units which will be added to the present equipment will be the equivalent of a 10,000-line office.

Anticipating the need of trained men to take care of this equipment, a preemployment test was conducted to select the type of man required for the job.

Ten high school graduates were selected and placed in training under the supervision of F. W. Kilgore, supervising switchman, and E. M. Griffin, switchman. Dial equipment was mounted in the class room and for two weeks these boys demonstrated whether or not they had the ability and the temperament to work with this type of equipment.

At the end of the testing period six out of the ten qualified were then taken into the dial offices for further training. At a later date these six boys will be placed with the installation crews of the Western Electric Company, assisting in the work of installing the equipment in offices No. 2 and No. 8.

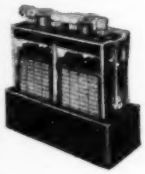
"STEWART" TEST SET

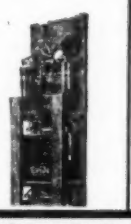
The "STEWART" Test Set tells which way and how far trouble is from you without cutting the line for test. It is equipped with detector coil as well as shunt method. Has transmitter circuit, making complete telephone. Thousands in use. Sent on trial. Price $32.00.

Send in your old set, we will make it work like new at a fair price.

Also Cable Testers, Test Cabinets and Detecto-Meters.

STEWART BROTHERS
OTTAWA - - - - ILLINOIS





DEPENDABILITY . . . long life . . . economical operating and maintenance costs are the reasons why the use of Exides is increasing in P.B.X. service.

EXIDE-IRONCLAD P.B.X. BATTERIES

Exide - Ironclad Battery, type B1-5, especially designed and constructed for P.B.X. service.

Exide BATTERIES
THE ELECTRIC STORAGE BATTERY CO., PHILADELPHIA

Get EVER-PROTECT aid in your construction.

EVER-PROTECT has proved practical and profitable in making many hundreds of cable installations underground without a conduit. It protects cable against storm damage, corrosion, chemical action, electrolysis and abrasion.

In liquid form EVER-PROTECT is great for overhead work, protecting your cable and messengers against chemical action and other destructive influences.

Ask your nearest jobber for complete details.

EVER-PROTECT CABLE COMPOUND
TRADE MARK REG. U.S. PAT. OFF.

National Cable Compound Co.
Incorporated
MITCHELL - - IND.

Note Protection at Corners

Blake Insulated Staples
Trade Mark

Unequalled for telephone and bell wiring. The fiber insulation prevents troublesome short circuits and grounds. 4 sizes. Pat. Nov., 1900. Write for samples.

Blake Signal & Mfg. Co.
BOSTON, MASS.

Prest-O-Lite Is Unusually Convenient

. . . easy to handle on a pole, underground, in the transformer room, or in the shop . . . easy to work in corners and close quarters . . . easy to regulate to the exact heat required . . . no pumping, no preheating, no waste of fuel between jobs.

Electrical Contractors and Utility Companies prefer Prest-O-Lite blow-torches because they speed up the work and do a better job at lower cost.

Ask your local Prest-O-Lite Gas Distributor to demonstrate this equipment for you or write us for complete information.

Prest-O-Lite is available everywhere. Anyone of 15,000 Prest-O-Lite Exchange stations can supply you quickly with a full tank.

THE PREST-O-LITE CO., Inc.
Unit of Union Carbide and Carbon Corporation
NEW YORK: Carbide and Carbon Bldg.
SAN FRANCISCO: Adam Grant Building
IN CANADA: The Prest-O-Lite Company of Canada, Ltd., Ontario

Prest-O-Lite GAS

Stromberg and Its Employes

Rochester Company Expends Every Effort to Bring About Friendly Co-operation Between Administrative Officials and Employes. New Plant Has Every Facility to Aid in Establishing This Personal Contact.

In building their new plant at Rochester, N. Y., officials of Stromberg-Carlson Telephone Mfg. Co. have greatly improved their facilities to bring their 1,800 employes in closer contact with the administration of the company.

Throughout the history of that company it has been the policy to expend every effort to bring about a friendly co-operation between the executives and employes and today Stromberg-Carlson maintains one of the most unique systems in this respect for a company of its size.

Employes are not only given an opportunity to present to the executives any problems that may arise during their work at the plant, but are free to present any problem which may come up in their personal life.

In case legal assistance is needed, advice is given by the executives or arrangement is made whereby the employes may obtain aid from attorneys.

In many instances workers have been given aid in the drawing up of contracts when purchasing homes. These and many other services have greatly reduced difficulties of the employes.

Before the World War Stromberg-Carlson offered its employes the opportunity of saving a small sum each week, which was deducted from the weekly pay and deposited in the industrial department of a Rochester Savings Bank. Pass books were kept for each employe by the bank.

During the war this plan was amplified by a similar system under which the weekly deductions were used to purchase government Liberty Bonds.

Desiring to give the employes the same opportunity they had had before the War, the savings plan was continued and has been in effect ever since.

About nine years ago an opportunity came to a few foremen and department heads in the plant to acquire stock in the company. So much interest was shown in the enterprise by these men that it was decided to widen the circle of employe investors and offer stock to more of the older and more important employes.

Still the interest grew and more and more employes sought the opportunity to buy with the result that today over 51 per cent. of the company's stock is owned by the officers and employes and their families.

The stock was not issued from the company's treasury but had to be purchased in the open market and resold to the employes without profit by the company.

In many cases the employes were unable to purchase the stock outright and, if arrangements for loans could not be made at banks, the company permitted the employes to pay for the stock by making deductions from their weekly wages over a five months' period. At the end of this period, if the employes desired to purchase more stock, they could under the same arrangements.

Stromberg-Carlson executives believe that the company is benefiting by the interest resulting from the ownership of stock by its employes; and likewise feel that in many instances men are now stockholders and trained in the habit of regularly setting something aside for the future who would not have effected any saving out of their earnings but for the opportunity given them.

In addition to all these services the company takes care of the filing of income tax reports for all employes who come under the income tax laws. This saves the time of the employes and saves them any difficulty which they might incur in filing the reports. Renewals for drivers' and auto licenses also are handled by the company.

Several years ago it was called to the attention of Stromberg-Carlson officials that many of their employes were without insurance and many times were forced to give up their work for a considerable length of time on account of illness or injuries not covered by the compensation law.

Seeing this was a hardship on the employes and recognizing the fact that some of them could not comfortably sacrifice the loss of their wages, the officials worked out a program for group sick and accident insurance, whereby the employes could be insured outside of working hours, the expense being carried half and half by the company and employes.

Now in case of illness or injury approximately two-thirds of the employes' wages are paid during disability and if necessary for a six months' period.

Thirteen hundred Stromberg employes have taken advantage of this service given them by their company.

Stromberg-Carlson has never forgotten the athletic and recreational side of the employes' lives and this year is not an exception to the rule as a unique athletic program has been outlined.

In the twenty-eight acres owned by the company two baseball diamonds, one soft ball and one regular, have been laid out, and fans of the National pastime in the plant have made great use of them.

Bowling, which is one of the outstanding activities of the Stromberg plant, officially started this week. Eight department teams have formed a league, playing games each week. Each week a fund is set aside to provide for prizes for winners of the annual tournament at the close of the season. One of the big events will be the banquet at which all bowlers will be feted at the end of the bowling season.

This year plans have been made to schedule basketball games with out-of-town teams in addition to playing Rochester industrial and semi-pro fives.

Last season the Radio and Telephone men won the industrial title of Rochester and downed some of the best semi-pro teams in Rochester and vicinity, winning twenty-three consecutive games.

Employes' safety and comfort have always received attention of Stromberg officials. Every effort was directed toward equipping the new plant with modern machinery having the latest guarding devices. Minor details such as providing workers with gloves and goggles shows the attention the Rochester company gives to its employes.

In case of sickness or injury a complete medical department has been installed in order to treat the ailing employes and to prevent serious consequences. Two nurses are employed and a physician spends an hour each day at the plant.

Stromberg-Carlson has taken every caution in insuring its employes against defective eyesight. Employes wishing eye tests are given free examinations and, if glasses are needed, they receive free lenses, the only cost being the price of frames.

A problem in transportation presented itself with the building of the new plant, which is situated a considerable distance from the heart of the city. Immediately the company made special arrangements with Rochester railway officials to operate buses to the plant each morning and from the plant at night. This service made it possible for the workers to get to and from work in a short period of time. *(Continued on page 38.)*

AMERICAN CROSSARM & CONDUIT CO.
14 Mills — Main Office—Chicago, Ill. — 75 Warehouses
Manufacturers and Distributors
CROSSARMS — FIR — Creosoted — Yellow Pine
Creosoted Wood Conduit
Pin and Brackets

Super-Service on rush orders!

If you are in a hurry your order can be loaded and on the way the same day we receive it. Quality poles since 1882 assures you of guaranteed stock and satisfactory dealings. Let us quote you prices.

Northern and Western Cedar
With or without butt treatment

NAUGLE POLE & TIE COMPANY
59 East Madison Street, Chicago

Branches: New York, Columbus, Kansas City, Spokane, Vancouver, Boston Yards: *Minneapolis, *Pinconning, Mich.; *Spokane, *Sand Point, Ida.; Vancouver, B. C. *Butt-treatment plants and Pentrex incising machines.

Naugle Poles

Insure Your Overhead Lines

BY SPECIFYING

NORTHERN or WESTERN

CEDAR POLES

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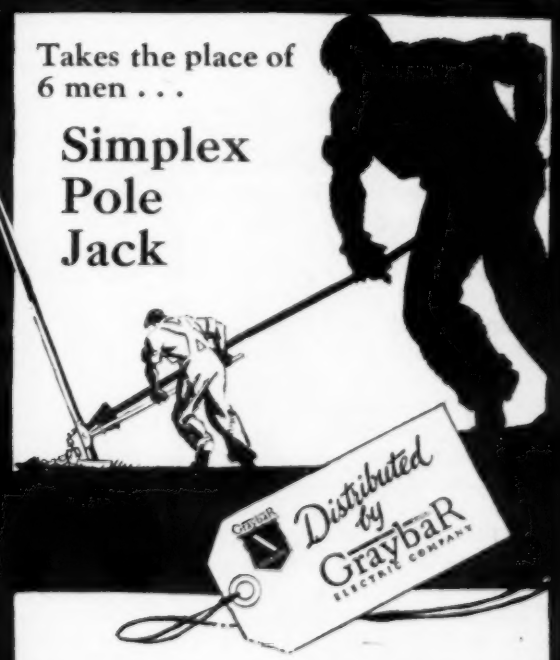
FROM

MacGillis & Gibbs Co.
120 E. Wisconsin Avenue
MILWAUKEE - WISCONSIN

Bell Cedar Poles
Piling & Ties
Western Red - Northern White
Creosote Butt Treating—Any Specification
Guaranteed N. E. L. A., W. R. C. A., N. W. C. A. Grades
Treating Plants and Concentrating Yards
Minnesota Transfer, Minn., Newport, Wash.
Other Concentrating Yards at British Columbia Points
There Are No Better Poles Than Those Produced by
BELL LUMBER & POLE CO.
Security Building Minneapolis, Minn.
Long Distance Phone Atlantic 2304

Takes the place of 6 men . . .
Simplex Pole Jack



Cedar Poles
Northern White Western Red
Plain or Treated Butts
Prompt Shipment from Minneapolis Yard.
T. M. Partridge Lumber Co.
Minneapolis, Minn.

Templeton, Kenly & Co., Ltd.
Sole Manufacturers
Established 1899 Chicago, Ill., U. S. A.

(*Continued from page 36.*)

For the employes who drive automobiles, two large parking spaces have been provided, one outdoor and one indoor. Officials predict that is a few years it will be possible to construct stalls or special buildings to house the cars of all workers.

Another feature of the new Stromberg-Carlson plant is the modern and sanitary cafeteria which serves 350 employes each noon hour and is designed to accommodate twice that number as the plant grows. For many years Stromberg has had a good cafeteria but it did not equal the one in the new plant. The best food that can be obtained is served the employes at cost.

Stromberg-Carlson is to be congratulated and commended for its effort to bring the administration and the employes in closer contact and no doubt such action makes for a better type of employe, better plant conditions, better products and in the end assures the highest degree of success.

The National Convention

(*Continued from page 22.*)

complete without further reference to the many and varied exhibits presented by manufacturers of telephone equipment and supplies. The large floor available and the splendid decorations of the booths made the exhibits the center of attraction. Entire booths were taken up by display of specialties and everything from tiny switchboard lamps to completely equipped construction trucks were displayed. The exhibits were an education in themselves and only lack of space prevents detailed description of them as an outstanding feature of the convention.

Merited Promotion

The appointment of J. H. Baker, present district manager at Nashville, by the Southern Bell Telephone Company to be the state manager is a recognition of ability of the highest order and will be intelligence pleasing to a multitude of friends throughout Tennessee and Kentucky. He succeeds D. F. Turnbull, who retires from active duty November 1, after thirty years of notably efficient service. He, too, has established himself firmly in the regard of the community, as well as of his business associates, and, it is pleasing to note, will continue to reside in Nashville. He is a Virginian by birth but for a number of years has been in charge of the Tennessee territory.

Mr. Baker, likewise, began his career with the company thirty years ago. Unremitting energy, close attention to every detail of duty, marked intelligence, the happy faculty of winning and retaining friendships and a ready tactfulness in public contacts made promotion in his chosen life work a certainty. For sixteen years he has held important positions with Nashville as headquarters; for ten years was district suburban manager and for six years has been district manager at Nashville. His fine executive ability has been a useful factor in the rapid expansion of the business of the company in this section.

Mr. J. B. Everett, who succeeds Mr. Baker in the district managership, was for many years cashier at Nashville and the numerous friends whom he left here are pleased to learn of his return.

Bell System Officials Talk to Australia

America talked with Australia through regular telephone instruments for the first time on September 25 when officials of the American Telephone & Telegraph Company exchanged greetings with the Australian telephone officials in Sydney. The occasion was an informal demonstration of the practicability of connecting the transatlantic telephone channel operated by the American Telephone & Telegraph Company and the British Post Office with the new short wave radio telephone channel operated by the British General Post Office between Great Britain and the Australian continent, that may soon be open for commercial use. The directive short wave transatlantic radio channel that is now in regular use for European service was used in the demonstration instead of the long wave channel so that the voices of the speakers were carried a total distance of 15,000 miles by the short wave system of transmission interconnecting the wire systems of the United States and Australia.

New Types of Buried Toll Cables

(*Continued from page 32*)

nearly 150 concrete manholes will be installed. These are being "precast" at a central point and hauled to the proper excavation by truck. The route at this point follows a stretch of highway, and this method, by saving the time required to pour and cast concrete on the job, cuts highway traffic interruptions to a minimum and makes for greater safety for workmen and motorists.

When solid rock is encountered in the digging of the trench, the trenching machine is replaced by air drills. The compressor unit is mounted on a truck, making it mobile. Another novel feature is the caterpillar trailer which carries the cable reels during the laying process. The reels, weighing about three and a half tons each, are loaded on the trailers by means of steel rope slings passed around the reel. Power is furnished from a winch mounted on the tractor which pulls the trailer. When a steep grade is in the path of the cable or it must pass under paved roads, railroads or pipe lines, the cable is laid with the assistance of rollers placed every fourteen feet.

A considerable portion of the Southwestern Bell's cable construction program has already been completed. The accompanying photographs show some interesting features of the work while in progress.

Telephone Co. Officers to Meet

Members of the Ohio State Independent Telephone Association, numbering more than 125, were in session Friday afternoon at the Lima Club. It was the fourth district meeting of the organization, Lima being selected for the meeting of the Northwestern Ohio district.

J. W. Safford, president of the association, and Frank McKinney, secretary, presided at the meeting. Among those present at the meeting were Ohio's most prominent telephone officials. The business session followed luncheon at noon.

General discussion of the telephone business was taken up by the president and secretary.

Phone Extension Reductions Made

The Southern Bell Telephone Company has announced a substantial reduction in the charge for installing extension telephones to become effective November 1.

The new charge for installing business extension telephones ranges from $1.50 in the smaller exchanges to $2 in the largest exchanges.

The charge for installing residence extension service ranges from $1 in the smaller exchanges to $1.25 in the largest exchanges.

All extensions at the present time cost $3.50 to install.

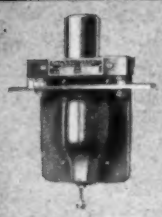
The company's announcement states that the reduction is primarily for the purpose of making the service more attractive and to enable more of its patrons to enjoy the added convenience of extension telephones.

Local Bank Installs Switchboard System

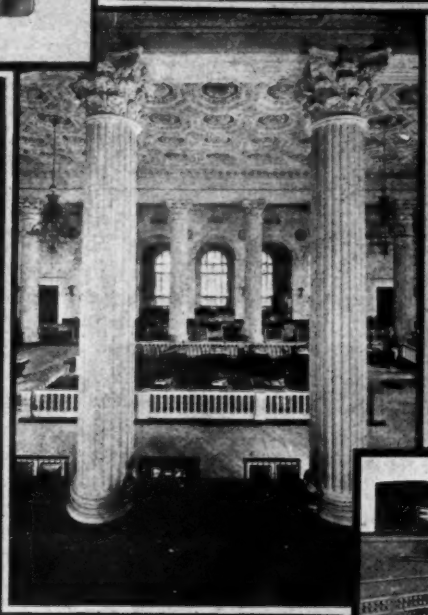
A complete telephone system connecting all departments with a central switchboard now is being installed for the National Bank of Arkansas by the Southwestern Bell Telephone Company. Work of installing the system was begun yesterday and will be completed this week.

W. H. McLeod, cashier of the bank, said this morning that the system is being installed to allow the bank to give its customers better service, and that it is a step made necessary by the growth of the bank.

Telephones will be installed in all of the banking departments and an operator will be employed to operate the switchboard and take care of all calls.



SIGNAL ENGINEERING STANDARD



CALL SYSTEM

ASSURES PROMPT
COMPLETION OF CALLS

Broadcasts code calls
with soft mellow tone of
CHIME BAR BELL

Approved by Investigating Committee of Architects and Engineers; Underwriters' Laboratories, Inc., etc.

Visit our exhibit at New York Power Show December 2nd to 7th.

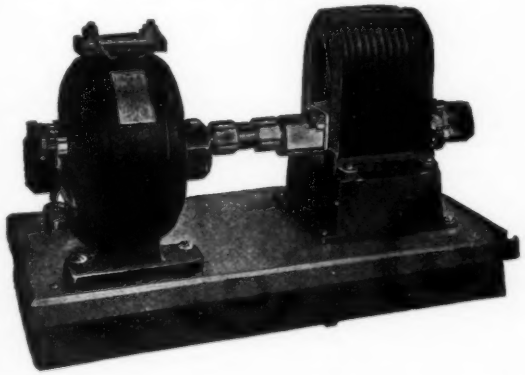
S. W. Straus & Co., noted for efficiency and progressiveness, uses *Signal Engineering* Standard Call System in its beautiful Chicago offices.

SIGNAL
ENGINEERING & MFG. CO
162 WEST 14TH ST. NEW YORK

HOLTZER-CABOT

Magneto - Ringing - Motor - Generators

Maintain Better Service



Maintaining an efficient, economical, carefree ringing service need not be a problem—bit it does require good judgment in selecting your equipment.

Install Holtzer-Cabot Magneto Ringing Motor Generators. These units will enable you to dispense with battery maintenance and constant service diligence. Can be supplied for any voltage or special current.

We invite correspondence. Complete data on request.

HOLTZER-CABOT ELECTRIC CO.

125 Amory Street, Boston, Mass.

6161 So. State Street, Chicago, Ill.

VICTOR TELEPHONE CELLS

The standard cell of the independent telephone industry. Uniform in quality. Dependable in service.

The Carbon Products Co.
LANCASTER, OHIO
11 South La Salle Street, Chicago

Ramblings

The report of John H. Wright of Jamestown, N. Y., president of the New York State Automobolie Association has been received, and, like all work undertaken by this gentleman, the report is most complete. The work being done by that organization will make it safer and easier for all automobilists to travel in New York State with less difficulty and more comfort. Through the efforts of the association thousands of markers will be placed on the state highways the coming year; and they are badly needed, too. Many states have better markers than has New York, and when these markers are placed we shall feel greatly relieved, as will thousands of others. It is refreshing to see a man whose time is taken up with matters of more financial interest to him, give of his time so freely for the benefit of his state and the public as has John H. Wright.

* * *

The Investment Bankers Association of America recently went on record as favoring state control of public utility corporations. These great men in the financial world can very readily see where corporations other than theirs is badly in need of regulations; these utility corporations should not be permitted to earn more than six or eight per cent per annum—that would be highway robbery. But with the banker it is different, if their "actions speak louder than words" as we are wont to say. Few banks have ceased to exisit for want of patronage; most of them, in the past, have shown large earnings—some as high as 12 per cent to 20 per cent per annum. But with the advent of "big business," these concerns have added additional burdens to their customers by placing service charges on small depositors and collection fees on all depositors in many cities and towns. Where a bank earned a fair dividend under the old method of doing business, it is now earning—or should earn if properly handled—dividends equaling its capital stock annually. Such men as the American banker saying that other lines of business should be restricted, gives us a pain.

* * *

Reports from New York say on October 1st—moving day in that great city—about seventy-five thousand telephone moving orders were on the hook. Some job, we'll say. Such occasions call for an enormous expense in moving phones quickly—for every one of these customers want immediate service—and we are glad that the telephone companies have adopted the plan of charging for moving telephones; but at the same time they are under obligations to give the customer immediate service under the circumstances.

* * *

"Well, we had that convention at Chicago we have been telling you about, and believe me, it was some gathering! As of old, phone men from far and wide came, and the registration proved larger than for several years past. And out of the past came some of the pioneers of the industry, some of whom have retired but still love the work in which they spent their lives. Among those who traveled many miles to again "be with the boys" was Charles E. Rolfe of Redlands, California. Only a few years ago he withdrew from actual ownership of telephone properties in his own home town, but he still loves the industry and those who compose it. Mr. Rolfe is well along in life—we are not divulging secrets or we might mention his age—but he is still active in association affairs of the industry. Here's hoping that he attends as many more National conventions as he has in the past—and that is more than two score.

* * *

Ernest Irwin of Pomona, California, who has guided the affairs of the California Independent Telephone Association for lo, these many years, on November 1st joined the forces of the Associated Telephone Company, Limited, with headquarters at Los Angeles. Mr. Irwin becomes assistant to the general manager of that concern. However, he will supervise the work of the telephone association in that state, though the actual work will be carried on by others. The office of secretary of the California Independent Telephone Association will be located in Los Angeles in the future.

* * *

C. Y. McVey was another of the "old-timers" to visit the National convention this year. McVey was president of our National association at one time, and since his retirement from telephone duties we understand he still makes Cleveland his home.

* * *

C. A. Shock of Sherman, Texas, and a director of the United States Independent Telephone Association, brought a stalk of cotton to the convention; the stalk contained many bolls of cotton fully matured and opened. This cotton grows around Sherman, and is one of the main products of Texas. The stalk attracted much attention, many people viewing the sight for the first time in their lives.

* * *

And while we are talking about prominent pioneers and Texans, we might mention R. B. Still, perpetual president of the Texas Independent Telephone Association. Still is not president because he is the only telephone man left in that state, but because he fills the position better than any other man ever has, and probably ever will. He was elected a director of the United States Independent Telephone Association at the recent convention.

* * *

F. A. Bowdle of Cerro Gordo, Illinois, received word while attending the convention at Chicago that his son, who is attending school at Wheaton, Illinois, was injured in an automobile accident near that place. This is the second serious accident that has happened to young Bowdle, the first being several years ago when an accident deprived him of the use of one eye.

* * *

A greater number of manufacturers and jobbers exhibited at this convention than in former years, and the unanimous verdict indicated that a good business year had been experienced during nineteen twenty-nine.

* * *

And about that Pioneer luncheon and entertainment: Boy, that was best ever. We do not know how it could be produced for the price of the tickets—we know it could not be—and we would be willing to add a donation if such was needed, for it was simply great. Those who planned this year's luncheon and entertainment should be extended a vote of thanks—and made a perpetual committee for future occasions.

* * *

Now that the convention is history, we would like to know just how the manufacturers and the members and visitors liked the Stevens hotel as convention headquarters. It is too early to talk about next year's meeting, but we would like to have you write us whether you prefer the Stevens or some other hotel for gathering next year.

* * *

During the convention someone kidded us about speaking of a certain executive as a seat warmer. We will have to plead guilty to using the language, but we did not mean to infer that he was a drone; there are no drones in the telephone business. None of this class stood the test of pioneering, and since the industry is on a permanent basis they cannot get back into it, nor would they be welcomed if they did. This page is dedicated to our friends—and we love them as our brothers. Too often we drop into slang, but we mean no offense, we are only kidding.

New Type Phone Convenient

Portable telephones that are plugged into specially wired sockets, in somewhat the same manner as electrical appliances are connected, have been designed for the home.—Providence Journal.

Stromberg-Carlson at National Convention

Stromberg-Carlson delegates to the convention of the United States Independent Telephone Association at Chicago, October 22 to 26, inclusive, were back in Rochester this week-end, proclaiming the convention as one of the most successful ever held by the Association.

Nineteen men represented the Main Offices at Rochester at the session. They were W. R. McCanne, president; G. A. Scoville, sales manager; R. H. Manson, chief engineer; E. A. Hanover, purchasing agent; E. A. Reinke, assistant sales manager; E. G. Eidam, assistant chief engineer; B. Woodbury, special representative; E. R. Stonaker, consulting traffic engineer; W. T. Eastwood, advertising manager; J. H. Levis; F. C. Young; V. Graham; E. E. Tune; Russell Vincent; W. T. Powell, engineers; J. C. Snyder; R. H. Barger; C. H. Bergmann, sales engineers, and B. Olney, acoustical engineer.

In addition to the Rochester representatives, delegates from the Kansas City and Chicago Offices attended. Those present from Kansas City were A. J. Roberts, manager; C. D. Kinne, assistant manager; J. C. Galligan and P. Winemiller, sales engineers.

Mr. Manson was one of the principal speakers at the meeting. He spoke on "The necessity of giving a High Grade Program Service and the Latest Developments in Program Service," at the meeting of the Program Service Division.

Stromberg-Carlson had one of the largest and most attractive displays at the convention. Its exhibit included a Junior Multiple Switchboard, hand set telephones, a section of the No. 12

(*Continued on page* 44)

Stromberg-Carlson Telephone Display at the Convention of the United States Independent Telephone Association in the Stevens Hotel at Chicago

MORE THAN HALF A CENTURY
of
TESTED SERVICE!
"ALWAYS RELIABLE"

No. 31—1 Quart Gasoline-Kerosene Covered by patents.

For more than half a century "ALWAYS RELIABLE" torches and furnaces have been blazing the trail in this industry. Today they are recognized as the standard for Service, Dependability and Economy. More than half a century of tested service has proven this.

For the Telephone Service man, who must be prepared for all adverse weather conditions, these torches and furnaces are indispensable.

Order through your distributor or mail order to us with your distributor's name.

OTTO BERNZ CO., INC.
NEWARK NEW JERSEY

STOCKS IN
Newark, N. J. San Francisco, Calif. New York City

TELERING
For Central Office and PBX Ringing

ONE REED!
ONE CONTACT!
IDEAL WAVE FORM

ORDER ONE ON TRIAL.
NO OBLIGATION TO KEEP.

Fully Guaranteed
Converts 60 Cycle Lighting Current to 20 Cycle Ringing Current.
POSITIVELY NO RADIO INTERFERENCE
Very low current consumption.
Model EX-3 has been proven the ideal ringing machine by hundreds of satisfied users.
Price $44.00—F. O. B. Elyria
IT PAYS FOR ITSELF
Sold by Leading Telephone Distributors

Telkor, Inc., Elyria, Ohio
(Write for booklet)

A STRIKING DISPLAY BY THE BRIGHT STAR BATTERY COMPANY

One of the attractive booths at the recent U. S. Independent Telephone Association convention held in Hotel Stevens at Chicago was that of the Bright Star Battery Company, who occupied Booth No. 21 and featured, among its other products, its No. 6 "Bag Type" dry cells for telephone service.

This company lays emphasis upon the fact that this particular construction of its product, while more expensive than ordinary methods of manufacture, permits them to guarantee a greater capacity for their battery both while in service and while on the shelf.

The manufacturer in referring to its bag type telephone dry cells, calls attention to an extract made from circular No. 79, Bureau of Standards, as follows:

"These are so called from the fact that the manganese-dioxide is contained in a cloth bag. The carbon rod with its surrounding mixture is wrapped in muslin and tied with string, forming a unit which can be placed in the zinc can, leaving sufficient space between the two for the electrolyte in the form of a paste. Manila cord of considerable size, glass beads, or pasteboard discs are used for the same purpose in the larger sizes of cells of foreign manufacture. The solution of sal ammoniac and zinc chloride is thickened with flour or other gelatinous materials.

This form of construction, which is rarely used in the larger cells made in this country, is almost universally used in making the small flashlight batteries. This may be due to several reasons. The bag-type construction tends to increase the life of the small cells, which is shorter than that of the larger sizes even when standing on open circuit.

The bag-type cell is commonly made in Europe in the large sizes. Two reasons which may partly account for this are (1) the relative cheapness of labor and (2) the fact that the practice of judging a cell by the magnitude of its short-circuit current, which is so commonly done in this country, is almost unknown in Europe. The bag-type cell does not usually give as large a short-circuit current as the paper-line cell of equal size, but may have better lasting quality. Hence to the average purchaser who thinks he is getting the most for his money from the cell that show the largest short-circuit current, the bag-type cell is at a disadvantage."

The large number of telephone companies now using their No. 6 dry cell, together with the fact that they serve some of the largest railroads in the country in their telephone and telegraph departments, is put forth by this manufacturer as a convincing argument that their product is, as they call it, "Supreme in Every Test."

The following will give a prospective purchaser some idea of just what goes into the Bright Star telephone dry cell:

1. A heavy protective layer of sealing compound.

2. Ample air chamber to provide room for the natural formation of gases.

3. Carbon rod accurately centered by precision machines to insure uniform chemical action.

4. Cloth bag in which the active elements are securely enclosed, preventing their coming in contact with zinc container, and making the cell proof against internal short circuits and destructive corrosion.

5. Heavy layer of electrolyte, made according to an exclusive formula which insures maximum life from the active elements.

6. Heavy zinc layer of uniform thickness and strength made on precision machines to accurate dimensions.

7. Cloth bag cut away revealing active materials compounded to an exclusive formula for maximum service.

8. Centralizer to insure uniform layer of electrolyte around active elements securing uniform action.

This manufacturer has been making dry cell batteries since 1909, and their main plant at Hoboken, N. J., occupies over 150,000 square feet. Additional branches and warehousing facilities are located in Chicago and San Francisco.

Among the other items manufactured by this company are Bright Star radio tubes, radio A, B and C batteries, flashlights, flashlight batteries, ignition dry cells and Vitaspark ignition batteries.

Representatives at the convention included Mr. L. A. Goodman, Chicago district manager, Mr. C. G. Wilkenhoener, branch promotion manager, and Mr. Rosenthal.

Installation of a New Transatlantic Radio-Telephone Service

Transatlantic Radio Telephone service between Spain and Argentine and Uruguay was inaugurated October 12 by the International Telephone and Telegraph Corporation when General Primo De Rivera spoke from the Andalusian Patio of the Compania Telefonica Nacional de Espana Pavilion in the Seville Exposition, Spain.

This new radio telephone circuit brings into direct communication the telephone companies in Argentine, Uruguay and Chili, controlled by the International Telephone and Telegraph Corporation, with its operating company in Spain, and through the latter virtually all telephones in Europe.

The circuit of a length of 9,600 kilometers (about 6,000 miles) works on the principle of short directed waves, fully equipped with a privacy device which prevents unauthorized listeners understanding the conversations.

The Spanish transmitting station is located at Pozuelo Del Rey about 35 kilometers east of Madrid and the receiving station at Grinon some 24 kilometers south of Madrid. The connection with Sevilla is made by the ordinary long distance lines of the Compania Telefonica Nacional de Espana. The transmitting and receiving stations in the Argentine are situated at Hurlingham and Platanos respectively, about 20 kilometers from Buenos Aires. Connection between Buenos Aires and Montevideo is made by means of long distance lines and submarine cables under the Plata River.

It Pays to Advertise

Billy Jones wrote the following on the blackboard:

"Billy Jones can hug the girls better than any boy in school."

The teacher, seeing it, called him up. "William, did you write that?"

"Yes, ma'am," said Billy.

"You can stay after school," said she.

The children waited for Billy to come out, when they began to guy him. "Got lickin', didn't ye?"

"Nope," said Bill.

"Get jawed?"

"Nope."

"What did she do?" they all asked. "Shan't tell, said Bill, "but it pays to advertise."

A. T. & T. Earnings Show Steady Rise

The American Telephone & Telegraph Company reports September operating income of $3,303,085, against $2,956,003 in September, 1928. This does not include income from dividends of subsidiaries. Western Union's operating income for September was $1,283,506, compared with $1,398,833 a year ago.

New Bronze Drop Wire Interestingly Demonstrated

A most interesting exhibit at the Telephone Convention was the demonstration of the new Kellogg bronze drop wire. The outstanding feature about this new type of bronze wire is its high conductivity.

An apparatus was hooked up, by which to measure the resistance of a tenth of a mile of the wire, right in the exhibition booth. This strikingly brought out that this new type of bronze wire has a resistance of only 32 ohms per mile.

Bronze has long been experimented with as material for drop wire, but previously it has been too stiff and had too high resistance to be satisfactory. This new type of bronze wire has conductivity equal to 85% of number seventeen copper. It has greater tensile strength and greater flexibility. In addition it has a good reclaim value.

The Kellogg Company has had a great deal of success in introducing this new drop wire in the independent telephone field.

Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of August 24, 1912,

of Telephone Engineer, published monthly at Chicago, Ill., for October, 1929.

State of Illinois, County of Cook, ss.—Before me, a notary public in and for the state and county aforesaid, personally appeared D. Weiner, who, having been duly sworn according to law, deposes and says that she is the secretary of the Telephone Engineer and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business manager are:

Publisher—Telephone Engineer Publishing Company, Chicago, Ill.

Editor—R. V. Achatz, Aurora, Ind.:

Managing Editor—J. A. Smith, Chicago, Ill.

Business Manager—J. A. Smith, Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) —Telephone Engineering Publishing Co., Chicago, Ill.; Harold L. Beyer, Chicago, Ill.; P. Kerr Higgins, St. Louis, Mo.; Agnes M. Leffert, Logansport, Ind.; W. J. Uhl, Logansport, Ind.; Mrs. W. J. Uhl, Logansport, Ind.; J. A. Smith, Chicago, Ill.; John H. Wright, Jamestown, N. Y.

3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: (If there are none, so state.) —W. H. Graffis & Sons, Chicago, Ill.

4. That the two paragraphs next above, giving the names of the owners, stockholders and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds or other securities than as so stated by him. D. WEINER, Secretary.

Sworn to and subscribed before me this 18th day of October, 1929.

(Seal) Anton O. Landes, Notary Public.

(My commission expires April 26, 1930.)

WANTED—First class man for switchboard work. Stromberg-Carlson equipment. Answer giving experience and reference. Petroleum Telephone Company, Oil City, Pa.

A. T. & T. Takes Lease on Danville Phone Building

Lease of space in the Bell Telephone building here for a period of three years, from August 1, to the American Telephone & Telegraph Company has been approved by the Illinois Commerce Commission, according to an Associated Press dispatch from Springfield. The lease is made with the Illinois Bell Telephone Company and calls for an annual rental of $13,718. The American Telephone & Telegraph Company has occupied part of the main floor and the basement in the building here for more than a year.

RECONSTRUCTED EQUIPMENT

Kellogg No. 6B Cordless P. B. X. board with 7 local lamp lines and 2 trunk Ckts. @ $50.00—10-local and 3 trunk type @	$65.00
Kellogg No. 97 or No. 118 Common battery desk set complete with No. 404 or No. 259 Steel signal sets, straight line or 16-33-50 and 66 cycle ringer	7.00
Keellogg or Dean drop coils, 100 ohm 35c ea. 500 ohm @	.50
Western Elec. No. 329 Transmitters with back & mouthpiece @	1.25
Western Elec. No. 250 or 229 Transmitters with back and mouthpieces @	1.15
Western Elec. No. 143 Receivers with cords @	1.25
Gray 3-slot wall or desk type paystations @	5.75
Gray 5c single slot desk or wall type paystations @	1.25
Kellogg No. 30A combine line drops and jacks, per strip of 10 @	12.50
Kellogg No. 28 3-bar 1000 or 1600 ohm Bdg. desk sets @ $10.00—4-bar $10.75—5-bar (all with New Cabinet inside connection signal sets) @	11 10
Kellogg No. 22 L. C. Transmitters with back and mouthpieces @	1.10

Write for Our Bulletin

REBUILT ELECTRIC EQUIPMENT CO. Not Inc.

1940 W. 21st St., Chicago

AMERICAN ELECTRIC AND MONARCH C. B. TELEPHONES

Latest type common battery desk set with enclosed gong steel bell box, straight line $7.75

Harmonic 8.00

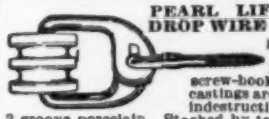
Latest type common battery steel wall set with enclosed gongs, straight line 6.50

Harmonic 7.00

BUCKEYE TELEPHONE and SUPPLY CO.

COLUMBUS, OHIO

PEARL LIFE-TIME DROP WIRE BRACKETS



Save time, labor and waste. Hot-galvanized screw-hooks and malleable castings are separable and indestructible. Standard 2 groove porcelain. Stocked by telephone manufacturers.

WM. H. PEARL CO., Indianapolis

Send for free sample and prices on

UNIVERSAL DROP WIRE INSULATORS

Universal Specialty Company

711 Poplar St., Terre Haute, Ind.

UNIQUE

HEAT PROOF

BALANCED LADLE

Reduces Overhang to a Minimum

You pour the metal exactly where you want it. Drop by drop or in a stream!

The ladle cannot slip, twist or pull out of the *ventilated* handle.

Interchangeable—no holes to drill—a screw driver is the only tool required to attach or remove.

Bowl Diameters 2½, 3, 3½, 4"

GET ONE ON TRIAL

UNIQUE MFG. CO., INC.

221 Whiting St., Chicago, Ill.

(*Continued from page* 41)

Super-Service Multiple Switchboard, several private branch exchanges and program service displays.

Owners and managers of small exchanges at the convention were very much interested in the opportunity of operating a small exchange at a profit which is afforded by the Stromberg-Carlson Junior Multiple Switchboard.

The switchboard, it was explained at the convention, is a standardized product and, as such, can be manufactured on a production basis. As was pointed out, it has no frills and utilizes simple and reliable circuits. These features reduce costs so that the initial investment is well within the means of any company operating more than fifty lines.

As the board at the convention showed, all cord circuits are universal, which means that both Magneto and Central Energy telephones may be used, as conditions demand, without slowing up service by requiring the operator to make special cord selection for the different types of service.

If the advantage is taken of the opportunity afforded by the introduction of a better class of service, the owners and managers were told, a general increase in rates may be secured which will result in greater profits to the operating company.

If the exchange is less than 800 lines and the expected growth will not exceed that number for some years, the Junior Multiple solves the problem. It is comparatively an inexpensive board which will furnish the best service that may be obtained with any switching equipment of the non-feature type.

Up to the present, all Junior Multiple Switchboards have been built into wooden cabinets. For the first time Stromberg-Carlson Telephone Mfg. Co., displayed in their exhibit at the convention a steel framed Junior Multiple.

This switchboard offers many improvements. The board has a continuous black face without strips showing between sections. The structural strength of the board is greatly increased. The possibility of glued cabinet joints opening during transportation is entirely eliminated.

Seeing this switchboard cannot but convince that Stromberg-Carlson Company have made a big step forward in designing equipment that will put the small exchange on a really profitable operating basis.

Leases Tri-City Phone Co.

The Tri-City Telephone Company with headquarters at Creston, have leased their equipment for ten years to A. T. Salee of Rochelle. At the present time a site for an office confronts the management.

Independent Pioneers Meet

Independent Pioneers telephone men and women held their annual meeting and jollification at Chicago on Thursday, Oct. 24, as part of the program of the U. S. Independent Telephone Association convention. The meeting of the Independent Pioneer Telephone Association was held in the Hotel Stevens and the luncheon entertainment and dance was held in the grand ball room of the hotel.

The meeting was presided over by J. G. Ihmsen, president of the association, who called upon Secretary J. K. Johnston for his report which showed the association in good financial condition and the membership steadily growing. The committee on collection of relics for an exhibit of historical interest reported that the Rosenwald industrial museum of Chicago would provide space for the permanent housing of the exhibit.

In order to promote membership in the Pioneers' it was voted to establish a junior membership for those who have been in Independent telephony for 10 years but not the 15 years required for full membership. The election of officers resulted in the selection of George X. Cannon of Freeport, Ill., as president and J. K. Johnston of Indianapolis to succeed himself as secretary-treasurer. The usual list of vice-presidents representing the various states of the union were also elected. Resolutions of respect to the memory of eight deceased members were adopted.

After the close of the business meeting, Henry A. Barnhart of Indiana was introduced and he in turn presented the speaker of the occasion, Hon. Frederick A. Landis. Mr. Landis gave one of his humorous talks interspersed with bits of wisdom and homely philosophy which kept the crowd in gales of laughter.

After the meeting the crowd adjourned to the grand ball room for a splendid meal and two hours of entertainment made possible by the manufacturers' committee.

Correct TREE TRIMMING

THIS No. 1 Compound Lever Rope Pull Tree Trimmer is especially designed for telephone company requirements. It is operated by a rope and the drop forged crucible tool steel blade with compound leverage makes cutting extremely easy. A 13 inch metal pull lever, which greatly increases the cutting power, is placed 42 inches from the head. A spring retainer makes it possible to adjust the tension.

Obtainable with sitka spruce pole 8 to 16 ft. long and extra sections with aluminum sleeve for attaching. (See illustration.)

BARTLETT MFG. CO.

Box 52—3003 East Grand Blvd., Detroit, Mich.

Telephone Pioneers of America Meet at Minneapolis

The Telephone Pioneers of America held their annual meeting at the Nicollett Hotel in Minneapolis, Minn., on Oct. 18 and 19. At the first session, election of officers resulted in the selection of J. S. McCulloh, president of the New York Telephone Co. to succeed E. D. Nimms, president of the Southwestern Bell Telephone Co., as president of the association.

A feature of the program of the first day was a talking moving picture in which Edgar S. Bloom of the Western Electric Co. extended his greetings to the pioneers and expressed his regrets at his inability to be present. At one point in the picture Mr. Bloom was interrupted by Mr. E. K. Hall who was present in the audience and the spectators had the novel experience of seeing and hearing a conversation between the man on the screen and persons in the audience. A number of other sound pictures and demonstrations were presented during the meeting.

As Mr. McCulloh, the newly elected president, was unable to attend the meeting, a special hook-up of land line and radio was provided so that greeting came from him and also from Captain A. R. Brooks flying a Bell Laboratories airplane over New Jersey. Part of the program included a description of the new type of airplane radio telephone equipment which Captain Brooks was using as he operated the plane and spoke to the pioneers.

New Rates to Boost Pacific T. & T. Earnings

H. D. Pillsbury, president of the Pacific Telephone & Telegraph Company, says the rate decision of the California state railroad commission, announced yesterday, will increase the company's annual gross revenue by $2,100,000.

More Flexibility in Vitrified Clay Conduit

The flexibility of vitrified clay conduit in underground construction is now further emphasized by the introduction of the new NATCO Slant or Mitered Conduit, which provides a means of splaying or fanning duct banks spanning a viaduct.

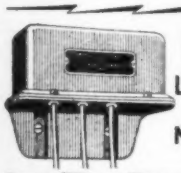
The Illinois Bell Telephone Company

Natco Slant or Mitered Conduit Approaching and Crossing a Viaduct at Aurora, Illinois

had the problem at Aurora, Illinois, of converting a duct bank two ducts wide and ten ducts high into a duct bank twenty ducts wide and one duct high, so as to pass over a viaduct without the use of manholes.

The old solution of costly manhole, with expensive splicing of cables, was eliminated by the use of NATCO Slant or Mitered Conduit which permitted the fanning or splaying of the vertical bank into a horizontal bank. Each course was brought up to grade and fanned to parallel horizontal position as shown in the accompanying photograph.

This new shape introduced and manufactured by the National Fire Proofing Company, offers a simple and inexpensive method of altering any duct bank formation without the use of manholes and at the same time providing a conduit permanent in form and in character.



CHAPMAN
LIGHTNING ARRESTERS
MADE BY
MINNESOTA ELECTRIC CO
MINNEAPOLIS, MINN.

EARL L. CARTER
CONSULTING ENGINEER
814 Continental Bank Bldg. Indianapolis, Ind.
Special attention given to all matters pertaining to Valuations and Investigation of Public Utility Properties.
Formerly Chief Engineer, Public Service Commission of Indiana

ACCOUNTING
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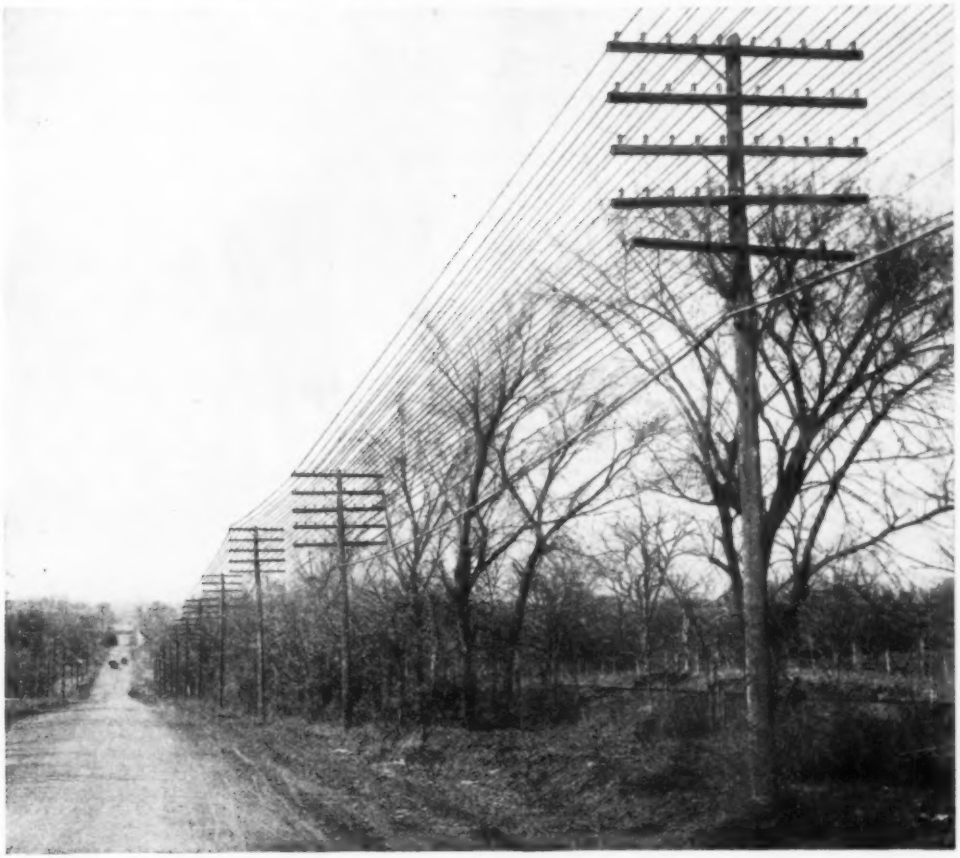

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Vol. 33
No. 12
December
1929

SUBSCRIPTIONS:—The subscription price of TELEPHONE ENGINEER is $2.00 a year in the United States, Cuba and Mexico; in Canada it is $3; in all other countries $4. Single copies, U. S. A., 20 cents.

Entered as second-class matter, June 6, 1922, at the post office at Chicago, Ill., under the act of March 3, 1879

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CONVENTION SCHEDULE.

Northern White Cedar Association, Hotel Radisson, Minneapolis, January 14-15.

South Dakota Telephone Association, Watertown, Hotel Lincoln, January 14, 15 and 16.

Minnesota Telephone Association, Radisson Hotel, Minneapolis, January 28-29-30.

Nebraska Telephone Association, Omaha, Hotel Preston, February 11, 12 and 13.

Oklahoma Utilities Association, Tulsa, March 11-12-13.

Texas Independent Telephone Association, annual convention, Hotel Texas, Fort Worth, March 18-21, 1930.

Pennsylvania State Telephone & Traffic Association, Penn-Harris Hotel, Harrisburg, May 13, 14 and 15.

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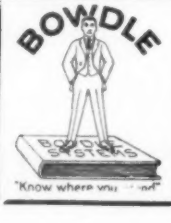

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